Dental Digest

y-Sixth Year of Publication

January 1960

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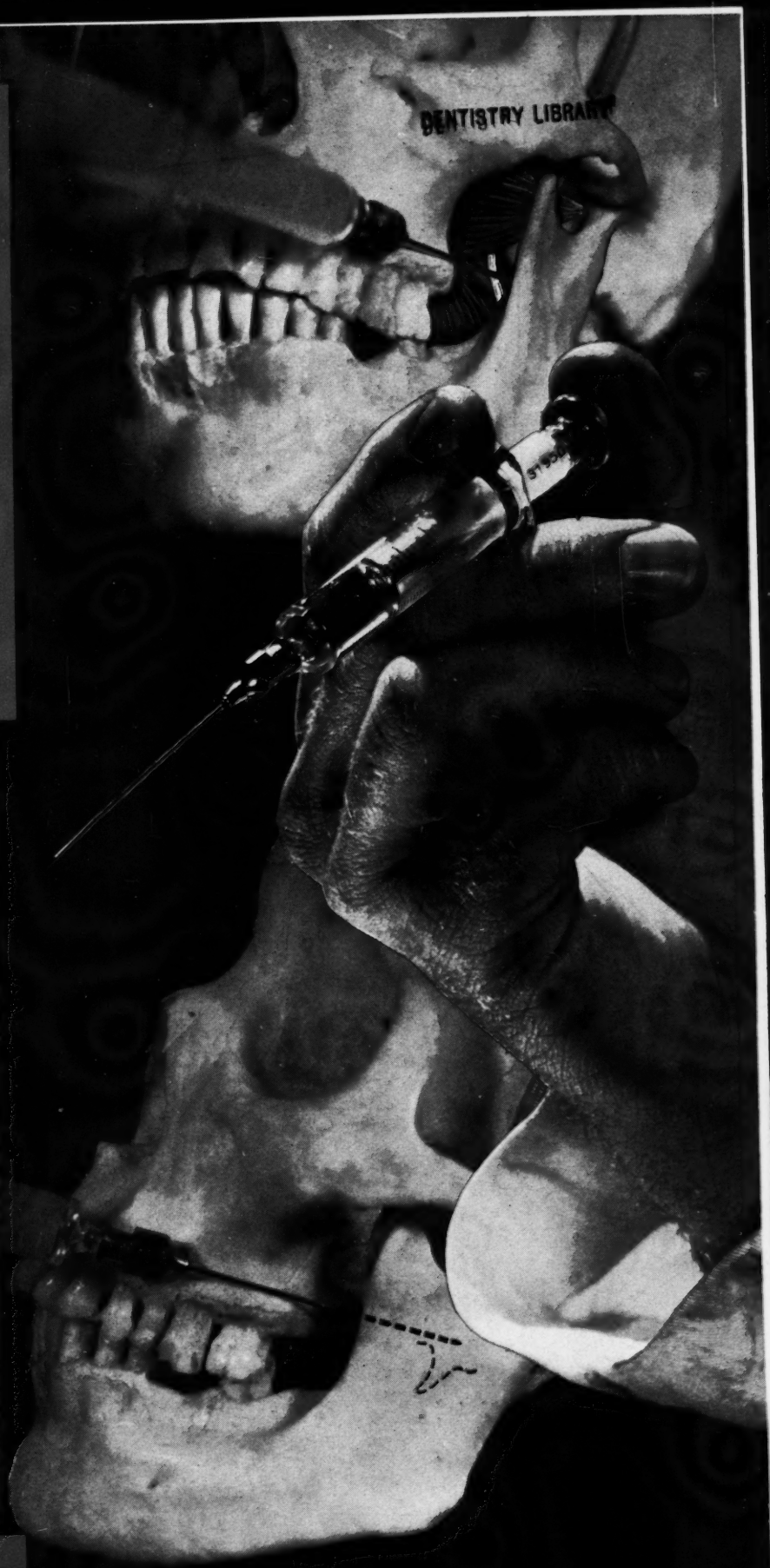

Vol. 66, No. 1

Dental Digest

Registered in U.S. Patent Office

JANUARY 1960

About Our CONTRIBUTORS

SUNDER J. VAZIRANI, D.D.S. (University of Bombay, College of Dentistry, 1952), M.S. (University of Illinois) was until recently a member of the faculty of the University of Illinois Research and Educational Hospitals. He is now practicing dentistry in his native city, Bombay, India. Doctor Vazirani adds to his contributions to dental literature, presenting in the current issue CLOSED MOUTH MANDIBULAR NERVE BLOCK: A NEW TECHNIQUE.

RAPHAEL ESCOE, B.S. (City College of New York, 1948), D.D.S. (New York University College of Dentistry, 1953) is a general practitioner and has been a contributor to DIGEST since 1956. This month he presents A FORCEPS-FIXATOR EXODONTIC TECHNIQUE.

LEO STOLL, D.D.S. (New York University College of Dentistry, 1931) is engaged in the general practice of dentistry. He has devoted thirty-two years to research in the field of occlusion and articulation and is well known as an authority on these subjects. In this issue Doctor Stoll presents the first of a series of seven articles which appear under the general title of CLINICAL APPLICATIONS OF OCCLUSION AND ARTICULATION.

DONALD E. SHAY, B.S. (Lebanon Valley College, 1937), M.S. (University of Maryland, 1938), Ph.D. (University of Maryland, 1943) has been a member of the faculty of the University of Maryland Dental School since 1945 and has published two books as well as 27 articles reporting the results of his varied research projects. Doctor Shay publishes in DIGEST for the first time in the current issue. His title is THE COMPARATIVE FERMENTATION OF POLYHYDRIC ALCOHOLS IN SALIVA FROM CARIES SUSCEPTIBLE AND NONSUSCEPTIBLE MOUTHS.

EDWARD J. RYAN, B.S., D.D.S., Editor
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CLOSED MOUTH

*Mandibular Nerve Block: A New Technique**

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DIGEST

Great advances have been made toward the achievement of pain-free dental surgery, and anesthesiology has become indispensable in the practice of modern dentistry.[2] Anxiety, apprehension, tenseness, and fear of pain, however, are common subjective symptoms which keep the patient from availing himself of dental care. Fear of pain is still the most important problem in the practice of dentistry and is the major preoccupation of most dentists.[1] The step-by-step technique for a closed mouth mandibular nerve block demonstrated in this article was developed at the University of Illinois, has been adopted by the author, and has been used on 3,092 oral surgery cases at the Research and Educational Hospital Clinics of the University of Illinois. A five-year clinical study reveals this procedure to be a simplified, atraumatic, direct approach to anesthesia; it has been well accepted by patients and is especially suitable to children.

General Considerations

New anesthetic agents, adjuvants, and new techniques are being introduced constantly in order to provide optimum anesthetic management for the patient. In this field pharmaceutical research laboratories and surgeons have played a major role by providing more effective agents and refined techniques.[3,4,5,6]

Common Problem in Anesthetization of Lower Jaw—Every dentist who has attempted to anesthetize a lower jaw with nerve-blocking injections knows the difficulties encountered in completing this procedure. The common problem is the pain which may be produced by the injection itself.

New Technique Introduced—To enable the dentist to make an inferior alveolar nerve injection with ease and the least discomfort to the patient, a new modified closed mouth technique, suggested by anatomic landmarks, has been indicated as having definite advantages over the conventional methods employed.[1,7,8]

*Presented before the Centennial Meeting of the American Dental Association, New York, September 1959.

[1]Monheim, L. M.: Local Anesthesia and Pain Control in Dental Practice, St. Louis, The C. V. Mosby Co., 1957.

[2]Vazirani, S. J.: General Anesthesia Training and Teaching. J. Am. D. Soc. Anesthesiol. (February) 1958.

[3]Chaikin, L., and Rubin, B.: Mandibular Anesthesia: A Simplified Technique, JADA **53**:675 (Dec.) 1956.

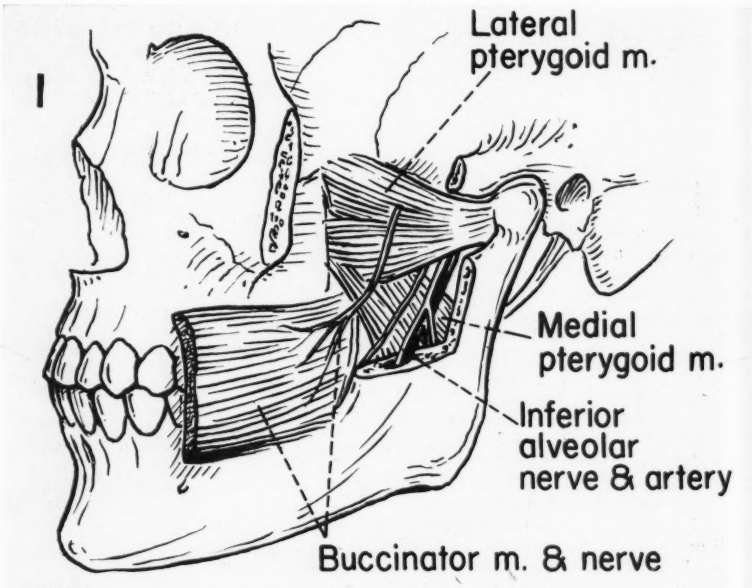
[4]Ekmanner, S., and Persson, H.: Mandibular Block. Digest Dent. Science, p. 181 (March) 1953.

[5]Nevin, H. R.: Mastering the Mandibular Injection Technique, New York Novocol Chemical Mfg. Co., 1954.

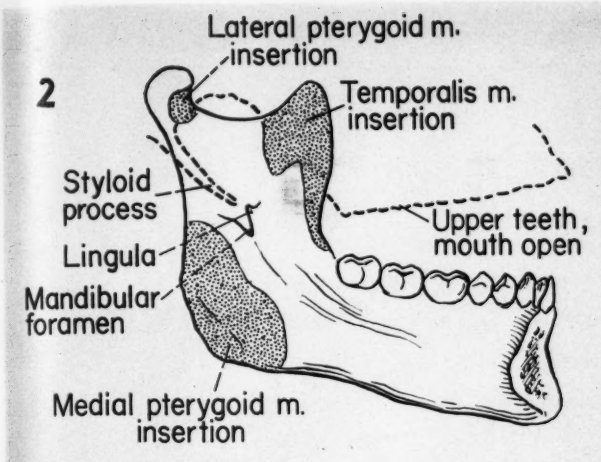
[6]Viegas, A. R.: New Method of Block Anesthesia, JADA **53**:543 (Nov.) 1956.

[7]Nevin, M., and Puterbaugh, P. G.: Conduction, Infiltration and General Anesthesia in Dentistry, New York, Dental Items Interest, 1948.

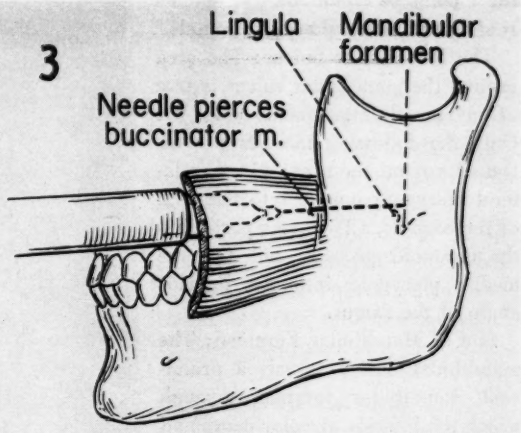
[8]Seldin, H. M.: Practical Anesthesia for Dental and Oral Surgery, Philadelphia, Lea and Febiger, 1947.



1.
The diagram illustrates boundaries of the pterygomandibular space.



2.
The medial surface of the mandible reveals the mandibular sulcus and surrounding muscle attachments.



3.
The diagram demonstrates important landmark and site of the mandibular foramen.

A Nerve Block

Regional analgesia or nerve-blocking has assumed a paramount position in achieving mandibular anesthesia. In regional anesthesia, a solution of a drug is deposited into the immediate neighborhood of a selected sensory nerve and by direct action on the nerve fibres, blocks transmission of impulses from the region. In other words, the deposition of the anesthetic agent in the vicinity of the nerve is sufficient to produce deep anesthesia.[1] With this type of anesthesia the mandible or surrounding parts of the mandible can be rendered insensitive to pain by an injection to the inferior alveolar, lingual, and long buccal nerves.

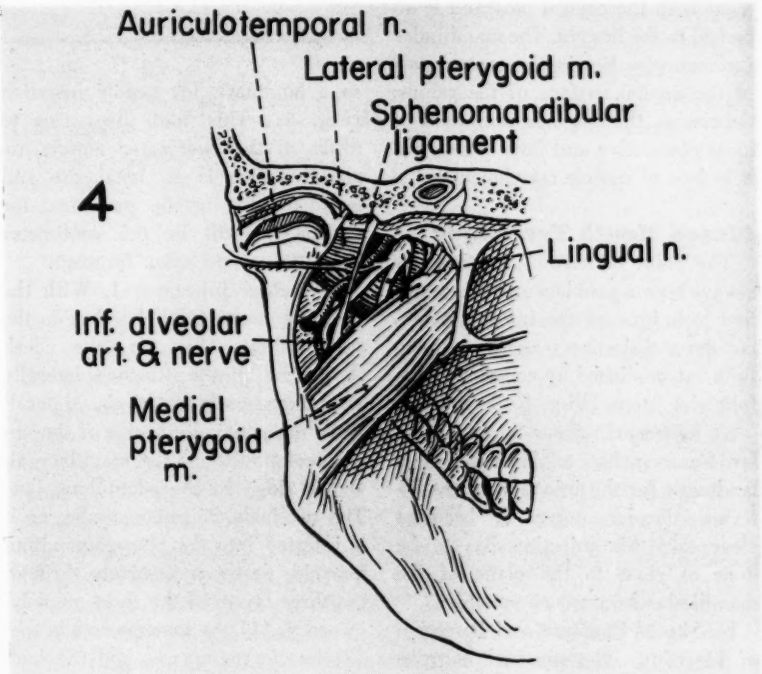
Anatomic Considerations

The mere knowledge of the structures of the oral cavity is not sufficient; the operator must know exactly the site and relation of the various structures through which the needle must pass in order to reach its proper point of destination.

Ideal Site—To anesthetize the inferior alveolar, lingual, and long buccal nerves, the pterygomandibular space is the ideal site to deposit the anesthetic agents.[7,8,9] The cooperation of nature is remarkably demonstrated by the formation of this triangular space. It is almost as though this space has been created for the purpose of a nerve-block.

Solution Readily Absorbed—It is seen that the mandibular sulcus is devoid of muscles on the inner surface of the ramus and the space is filled with loose connective tissue, in part of the alveolar and adipose variety, which acts as an excellent sponge for the absorption and diffusion of the anesthetic solution.

The Pterygomandibular Space: This is a well-defined triangular space between the mandibular ramus and the pterygoid muscles (Fig. 1). Its lateral wall is formed by the ramus of the mandible, its medial wall by



4.
Contents of the pterygomandibular space are shown in this diagram (dissected from rear).

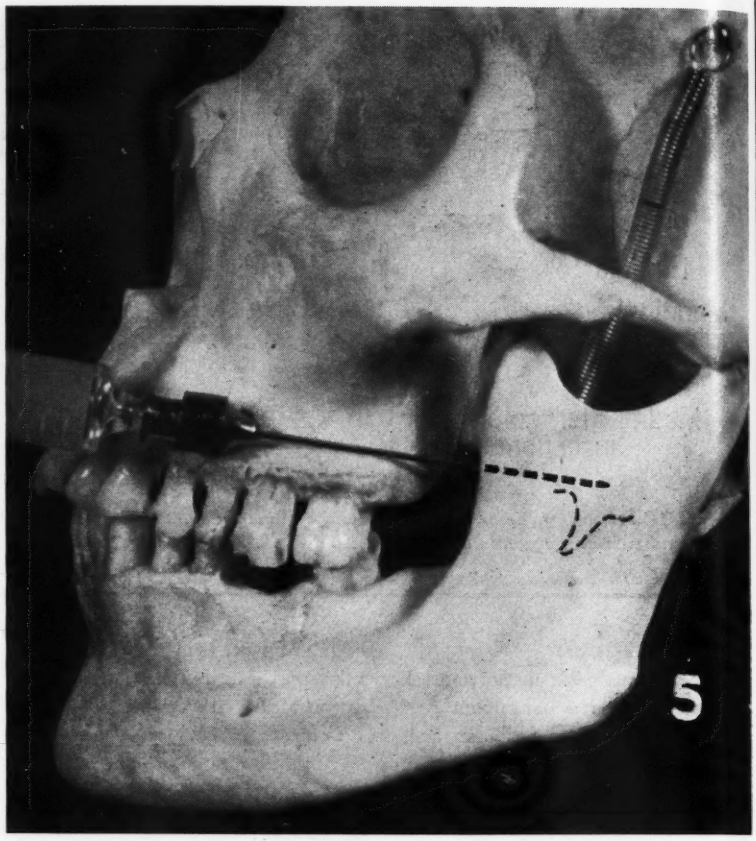
[9]Sicher, H.: Oral Anatomy, St. Louis, the C. V. Mosby Co., 1952, p. 412.

the medial pterygoid muscle and its roof by the lateral pterygoid muscle.[9]

The Mandibular Sulcus: The area around the mandibular sulcus is free of any muscle attachments (Fig. 2). Only the following muscles are attached around the area: (1) The lateral pterygoid muscle into the neck of the condyle, (2) the temporal into the coronoid process, and (3) the medial pterygoid into the inferior angle of the ramus.

Site of Mandibular Foramen: The mandibular sulcus reveals a prominent mandibular foramen through which the inferior alveolar nerve and artery enter into the inferior alveolar canal (Fig. 3). It is situated about the center of the inner surface of the ramus and lies in the extension of the occlusal plane of the molar teeth. This is an important landmark but varies in each case. On the anteromedial side of the mandibular foramen, there is a bony projection, the lingula. It affords attachments for the sphenomandibular ligament.

Contents of the Space: The main structures are the inferior alveolar, lingual, and long buccal nerves and the inferior alveolar artery and veins (Fig. 4). The sphenomandibular ligament is in the central part and is attached to the lingula. The mandibular foramen also lies in the central part of the medial surface of the ramus. Otherwise, the space is composed of loose connective and fatty tissue, but it is free of muscle attachments.



5.
Final position of needle for blocking the inferior alveolar nerve. Note that the needle should be placed parallel to gingival margins.

Closed Mouth Technique

The point of needle insertion has always been a problem and this modified technique of the inferior alveolar nerve injection can be successfully accomplished by completing the following steps (Figs. 3, 5, and 6):

a) Landmark: Since the mandibular foramen has to be used as a landmark for the injection to the inferior alveolar nerve, it becomes clear that this injection has to be done as close to the plane of the mandibular foramen as possible.

b) Site of Puncture and Direction of Insertion: The gingival margins of the upper molar teeth will serve the operator as a clinical guide and the pterygomandibular fold will serve as a landmark for needle insertion (Fig. 3). This fold gives rise to fibres of the buccinator muscle anteriorly. This is an ideal site and landmark for needle puncture, for the needle will be 0.5 centimeter above the mandibular foramen.

c) Actual Injection: 1. With the patient's mouth fully closed or in the rest position (Fig. 6), the cheek should be gently stretched laterally so that the needle can be placed parallel to the gingival margins of the upper molar teeth or the maxillary alveolar ridge in the edentulous jaw. The two-inch, 25-gauge needle, as it is inserted into the pterygomandibular fold, passes successively through the three layers of the sheet, namely, in order, (1) the mucous membrane, (2) buccinator muscle, and (3) buccal aponeurosis.

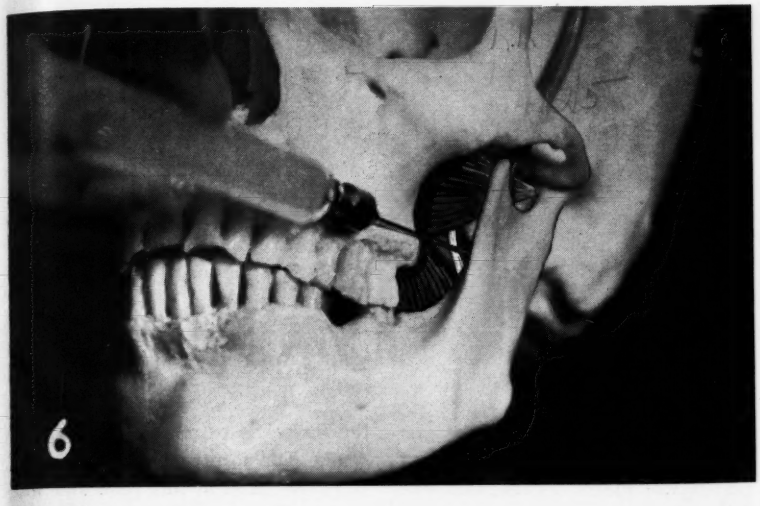
2. There is no marked muscle resistance and as the needle glides into the pterygomandibular space, it creates little or no pain because of the absence of terminal nerve endings in adipose tissue.

3. The anesthetic solution should be released drop by drop as soon as the mucous membrane is punctured.

4. The needle should be inserted into the tissue approximately 1.5 centimeters (the operator should use his own judgment as each case varies) and the anesthetic solution is deposited slowly into the pterygomandibular space.

5. Diffusion of the initially injected solution will also anesthetize the lingual and long buccal nerves. Even if the anesthetic agent is deposited away from the inferior alveolar nerve, again, by diffusion and gravitation it will reach the main trunk and will promptly anesthetize these filaments, thereby completing anesthesia.

d) It has been pointed out that the



6.
Clinical view illustrates the exact position of the needle in the pterygomandibular space. Note that the inferior alveolar nerve is medial to the needle.

ramus is not continuous in a straight line with the body of the mandible, but joins it at an angle. Thus the point of the needle will be away from the bone for a considerable distance.[7] The author suggests that the needle has to be maneuvered so that it glides along the pterygomandibular space and medial to this space.

Advantages of Technique

1) The technique is simple and direct.

2) It avoids trauma to the inferior alveolar nerve, artery, and veins.

3) It avoids interference with the styloid process. The skeletal material may be examined with the styloid process intact and the conventional method tried.

4) Trauma to the pterygoid muscles is avoided.

5) Extra needle punctures are eliminated.

6) The incidence of broken needles is extremely low.

7) The technique is ideal for a child patient.

8) It is far less painful than conventional methods.

Indications

1) When a conventional method has failed.

2) For the patient who has a trismus or ankylosis of the jaw.

3) In the presence of an acute or chronic infection in the submandibular space region.

4) For patient with facial fractures involving the mandible and maxilla.

5) In the case of the patient who is tense, nervous, or apprehensive.

6) A child patient.

Contraindications

1) In the presence of an acute or chronic infection in the pterygomandibular space area.

2) In the case of inadequate knowledge of the pterygomandibular space and surrounding structures.

Comment

This is a new closed mouth mandibular nerve block technique based on fundamental anatomic landmarks of the pterygomandibular space region. Technically it is a less complicated, painless, and direct approach to anesthetization of the inferior alveolar, lingual, and long buccal nerves. The author suggests that if the operator fails to obtain the desired results with the conventional method he may succeed with this new technique. With this technique anesthesia was successful 95 per cent of the time.

Arthur House
11 *Cooperage Road*

Staining of Teeth

Problem

A layman has been told by a prominent pediatrician and a dentist that multiple-vitamin preparations could cause staining of teeth in young children. The dentist advised use of preparations containing vitamins A, D, and C only instead of those containing the vitamin B-complex. The child has teeth that look iron-stained, though she has never taken iron preparations.

Discussion

Apparently there are no published reports that associate multiple-vitamin preparations with staining of teeth. The materials usually present in vitamin-B complex preparations for pediatric use would not act as chemical stains for the tooth surfaces. It is extremely difficult to stain dental enamel, even with histological dyes. Intrinsic green staining of enamel has been reported in association with a history of neonatal jaundice. The question notes the relationship between iron compounds and dental stain. There is also a possibility that the observed condition may be due to the action of chromogenic bacteria. Such factors may bear further investigation in this patient.

Adapted from Questions and Answers, *Journal of the American Medical Association* **171**:1626 (Nov. 14) 1959.

A FORCEPS-FIXATOR

Exodontic Technique

RAPHAEL ESCOE, B.S., D.D.S.,
Massena, New York

DIGEST

The instrument described in this article is a device evolved by the author which facilitates the extraction of teeth. It is a useful adjunct to the forceps. Among its many advantages are the facts that root fracture is avoided and hand fatigue is decreased. The technique involved in the application of the device is described in detail.

Description

The Escoe Fixator consists of a screw and a large knurled knob. The screw is placed through holes drilled in the handles of an extracting forceps (Figs. 1A and 1B). Any means of securely locking the forceps to the tooth may be adopted.

Function

The device creates an intimate, integral union between the forceps and the tooth by mechanical means.[1]

Technique Employed

The following steps should be completed:

(1) Free the neck of the tooth of gingiva (a sharp straight elevator, or scalpel may be used). If it seems necessary chip away some bone so that ideal beak placement may be made on a *sound* root.

(2) Ideal beak placement includes the following:[2]

a) Beaks placed in the long axis of the tooth.

b) Both beaks at the same horizontal level.

c) Beaks as close to the apex as tissues allow.

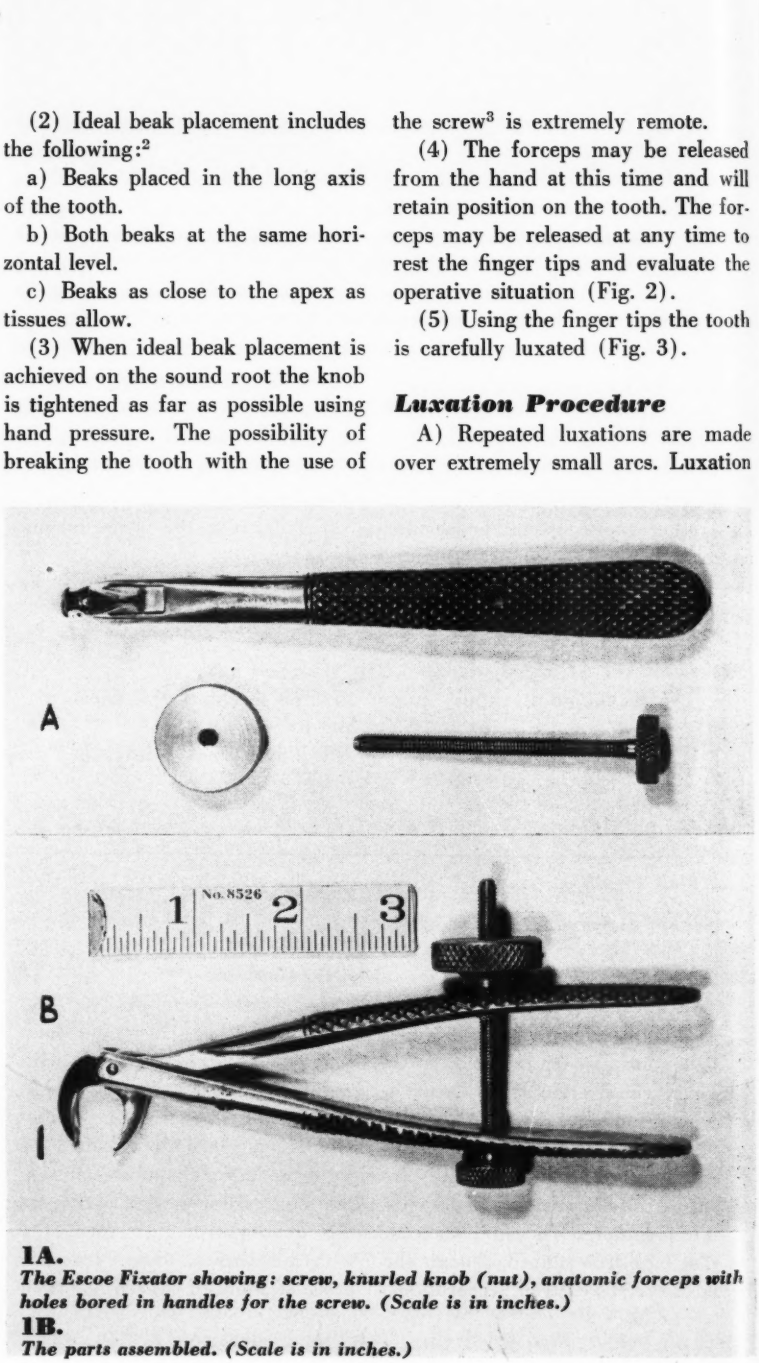
(3) When ideal beak placement is achieved on the sound root the knob is tightened as far as possible using hand pressure. The possibility of breaking the tooth with the use of the screw[3] is extremely remote.

(4) The forceps may be released from the hand at this time and will retain position on the tooth. The forceps may be released at any time to rest the finger tips and evaluate the operative situation (Fig. 2).

(5) Using the finger tips the tooth is carefully luxated (Fig. 3).

Luxation Procedure

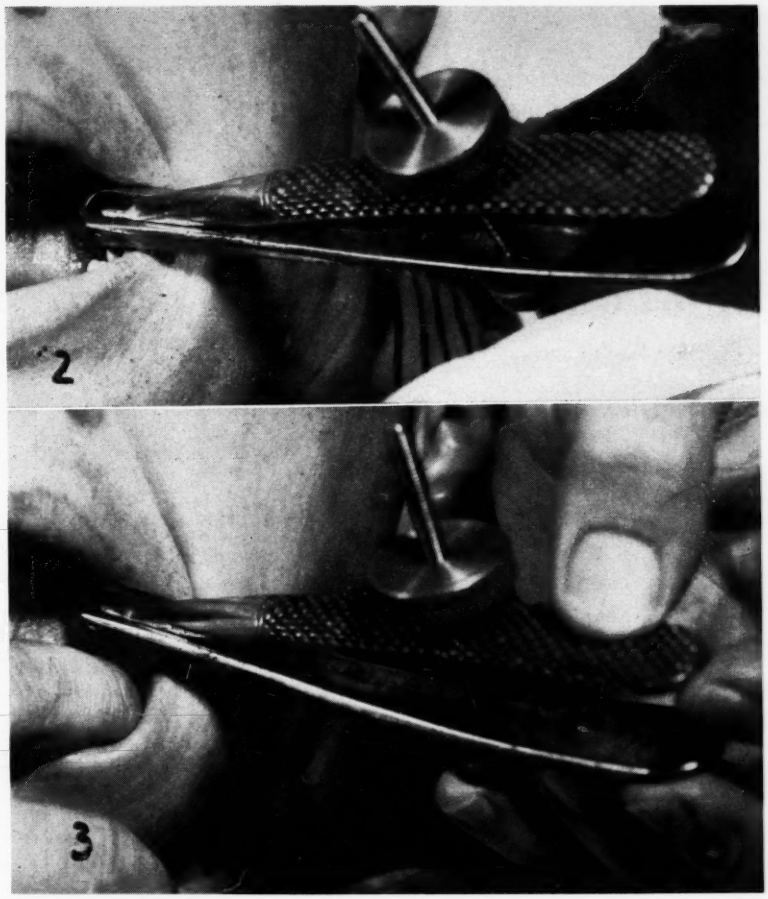
A) Repeated luxations are made over extremely small arcs. Luxation



1A.
The Escoe Fixator showing: screw, knurled knob (nut), anatomic forceps with holes bored in handles for the screw. (Scale is in inches.)
1B.
The parts assembled. (Scale is in inches.)

[1]Archer, H. W.: A Manual of Oral Surgery, ed. 2, Philadelphia, W. B. Saunders Company, 1956, p. 25.
[2]Berger, A.: The Principles and Technique of the Removal of Teeth. 8th printing, Brooklyn, New York, Dental Items of Interest Publishing Company, 1951, pp. 105-110.
[3]ibid.: page 108.

2.
Forceps may be released from the hand and will retain position on the tooth.
3.
The tooth is carefully luxated using the finger tips.



is buccolingual and/or rotary depending on the anatomy of the tooth (pre-extraction x-ray) and the mobility of the tooth as detected by the finger tips.

B) No traction is employed until the tooth is fully mobile. In cases where it is desired to section a tooth the mobile fragments are easier to remove.

C) It is unnecessary to apply force toward the apex to loosen teeth.

Comment

Occasionally in the process of extraction the forceps will loosen slightly (travel of beaks toward apex). When this occurs a few more turns may be taken on the screw. In cases where the root is conical the tooth may often be delivered using the screw only.

Main at Water Street

TABLE 1	**Conventional, Standard Forceps Technique**	**Escoe Fixation Technique**
Application of Force	Primitive: All force must be transmitted through a clenched fist.	Delicate: Force is applied with the finger tips which feel the mobility of the tooth easily.
Operator Fatigue	Great: Can not pause to rest without removing the forceps.	Minimum: Can pause to rest the finger tips while forceps placement is held constant.
Is the extraction subject to calibration? (Automation)	No. Force depends on the psychology and physiology of the individual exodontist. Governed by human factors, mediated through a clenched fist.	Yes. Measured mechanical forces can be applied. An extension may be welded to the handles of the forceps and force applied to this. Absolute mechanical control of direction, magnitude, frequency, and kind (static loading vs. dynamic blows) of luxating force is possible.
Wound Healing	Good	The same
Root Fracture	Frequent	Rare
Patient Reaction	Accept standard technique	Seldom notice variation in technique

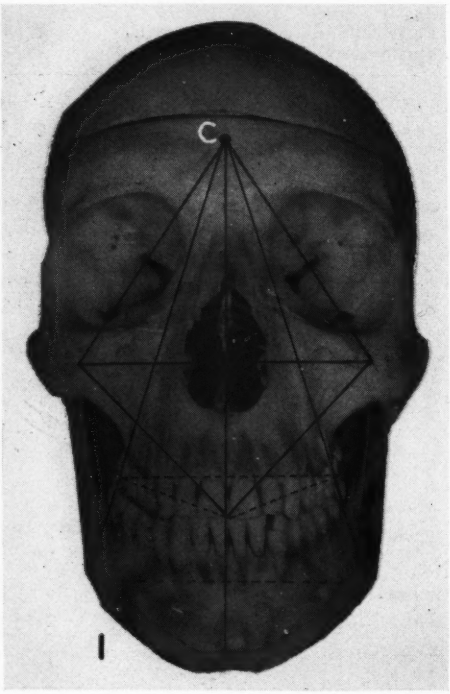
Clinical Applications of OCCLUSION *and* ARTICULATION – *Part One*

LEO STOLL, D.D.S., Woodmere, Long Island, New York

DIGEST

Balance in the occlusion of the teeth which is in harmony with the articulation of the jaws is generally regarded as desirable and essential for the normal physiology of the human masticatory apparatus. There is a wide difference of opinion, however, concerning much of the basic theory and the mechanical methods for applying the theory to clinical practice. This is one of the most controversial problems in dentistry. It has been the major interest of the author for more than 32 years during which a method was developed for using the maxillomandibular relations of casts or appliances mounted on an articulator determined by interocclusal "bite" records obtained from the patient to duplicate a variety of essential recorded maxillomandibular relations. These relations are used as an effective substitute for the dispositions and/or movements of the mandible as regulated by the temporomandibular articulations. Clinical application of this method was found useful for study, diagnosis, treatment planning, and execution of procedures involving balanced occlusion of the teeth in harmony with the articulation of the jaws.

The seven articles in this series of which this is the first, present a discussion of some of the theoretical principles evolved, a description of the mechanical means and techniques developed for applying these principles, and a description of the method used in applying the techniques.



1.
A front view of the skull and mandible showing the geometric analysis of the shape and form of the structures of the masticatory machine. They conform in a general way to a triangular segment of a sphere with the center, C, roughly in the region of the frontal bone.

Definitions

Because the correct interpretation of a statement frequently depends upon the precise meaning of critical terms, the following definitions are given for the terminology employed in these articles. The list is not intended as a complete glossary of terms associated with occlusion and articulation.

Occlusion—The contact relationship of the opposing teeth when the jaws are occluded, that is, closed against each other.

Balanced Occlusion—The equal distribution, throughout the entire dentition, of the occlusal contacts of the opposing teeth of the occluded jaws, the contacts being in harmony with the articulated occluded maxillomandibular relations of the jaws and/or the occluded relative movements of the mandible with respect to the maxilla, as regulated by the patient's temporomandibular articulations.

Centric Relation: The occlusion of the teeth in their "centric" relationship is considered to be balanced if the contact relationships of the cusps

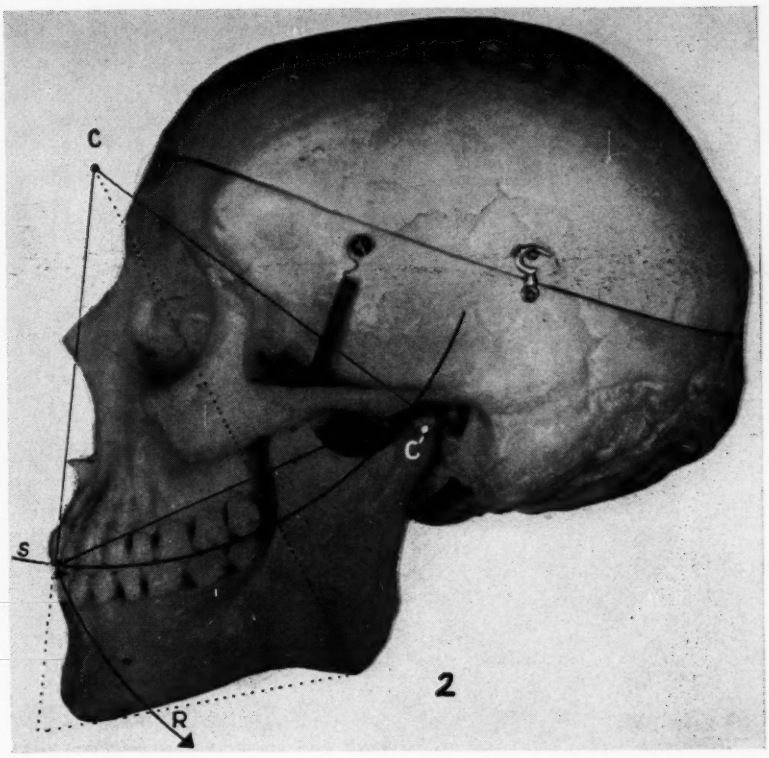
of the teeth are properly related anatomically to the fossae and grooves of the opposing teeth so that when force is applied to the jaws in centric relation all lateral displacing forces resolved by the inclined planes of the cusps of the teeth are neutralized. If this interrelationship between the cusps and the fossae and grooves of the opposing teeth does not exist when the opposing jaws are in centric relation, the occlusion of the teeth is not considered to be balanced, regardless of the equality of the distribution of the occlusal contacts.

Zero Cusp Inclination: With flat-cusped artificial teeth having a zero cusp inclination, the cusps of the opposing teeth may make balanced contact with each other. In this case there will be no lateral displacing forces generated when force is applied to them by the jaws.

Occlusion in Balance: Regardless of the nature of the cuspal anatomy, the occlusion of the teeth in centric relation, or so-called centric occlusion, is in balance when the sum total or resultant, of all lateral displacing forces generated when force is applied to the jaws in this relationship are equal to zero.

Contact Relationship During Mandibular Movements: During the occluded mandibular movements relative to the maxilla, to or from their centric relation, the occlusion is considered to be balanced and in harmony with the articulations of the jaw if the contact relationships of the cusps of the opposing teeth are maintained throughout the entire dentition during the mandibular movements. This balance can exist only if all the inclined planes of the cusps of the opposing teeth are physically in harmony with the regulation imposed upon the mandibular movements by the temporomandibular articulations of the patient.

Articulation—The jointed maxillomandibular relations and/or movements of the mandible relative to the maxilla, as determined by the constrained disposition and/or movements of the mandibular condyles in the temporomandibular articulations are an expression of the physiology of the articulations.



2.
A side view of the skull and mandible showing the geometric analysis of the structures of the masticatory machine. They conform, in a general way to a sphere with the center, C, roughly in the region of the frontal bone. The occlusal surfaces of the teeth, S, closely conform to the surface of the sphere. Also shown is the hinge-axis center, C', through which the mechanical hinge-axis of the mandibular lever passes and around which the mandibular hinge-like rotation R, takes place.

The principles of the spherical theory of occlusion and articulation were based on this geometric analysis of the structures of the masticatory machine and particularly on the theory that the occlusal surface of the teeth conforms to the surface of approximately a four-inch sphere. The cardinal error of the theory, however, was the complete disregard of the function of the mandibular lever, as it is regulated by the articulations which connect it to the skull.

Comment—Occlusion and articulation have distinctly different meanings. The two words are often improperly exchanged to mean the same thing:

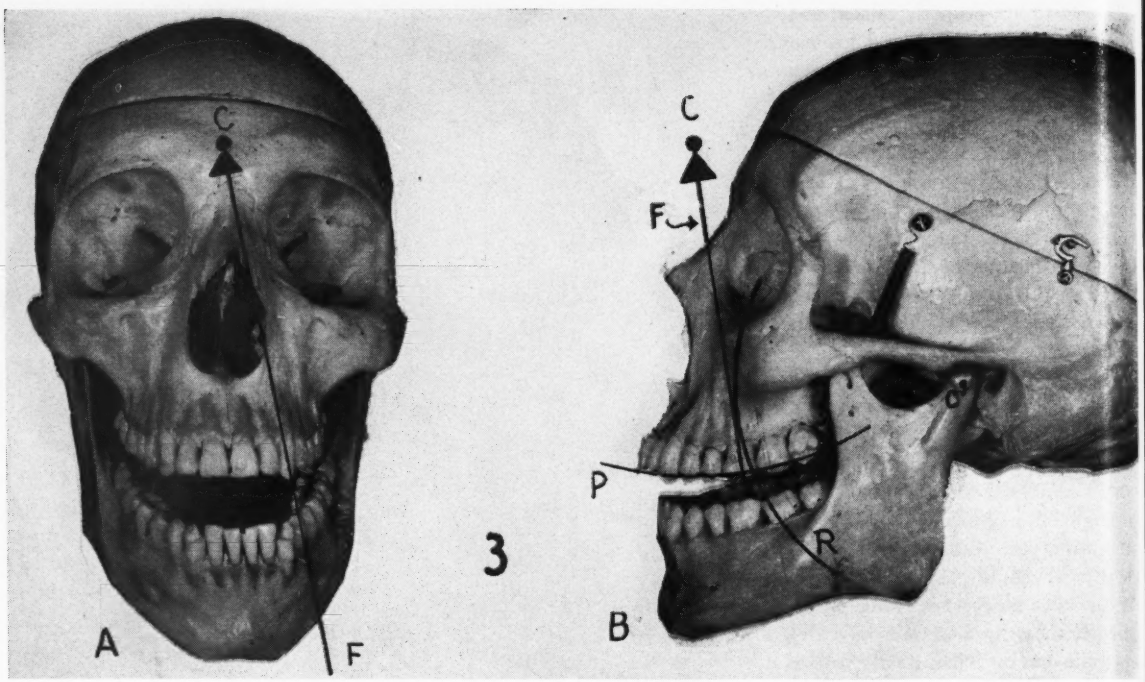
Occlusion: refers to the contact relationship of the cusps of the teeth when the jaws are occluded.

Articulation: refers to the jointed relative dispositions and/or movements of the jaws, as regulated by the temporomandibular articulations.

Closely Related: While occlusion and articulation are distinct entities, they are intimately related to each other when the problem of balance is in question. Balanced occlusion of the teeth, in a complete sense, cannot exist without an intimate harmonious relationship between the anatomy of the teeth and the physiology of the articulations of the jaws.

Centric Relation So-called "Centric"—The most retruded unstrained disposition of the mandible relative to the maxilla when the jaws are occluded at a particular dimension between the occluded jaws. This dimension is usually determined by the contact of the opposing teeth or their proper substitutes. This will be more clearly defined when the vertical dimension is discussed.

Determination of Position: The



3

3A and 3B.
A front view and a side view of the skull and mandible showing the general direction of a force, F, toward the point, C, in the general area toward which the resultants of the masticatory forces are directed by the mandibular lever when it acts against the skull. The long axes of the teeth are roughly coincident to the vectors of the forces and directed toward the structural center. This permits the teeth to offer the greatest resistance, without displacement, to the forces exerted upon them. The curve of the occlusal surfaces is not accidental. It is a structural necessity for the efficient function of the masticatory machine. This principle is utilized in the arrangement of the teeth when they are altered or replaced.

most retruded disposition of the mandible relative to the maxilla is determined by the most retruded unstrained disposition of the mandibular condyles within the temporomandibular articulations. This is the neutral occluded maxillomandibular relation from which all eccentric occluded maxillomandibular relations and/or mandibular movements relative to the maxilla are reckoned.

Relationship may be Incorrect: Under certain conditions, an apparently correct centric relation as recorded in the patient may actually be an incorrect relationship with the mandibular condyles in a strained position within the articulations. In many orthopedic procedures involving "repositioning of the mandible," as for instance procedure for the relief of temporomandibular disturbances, the recorded centric relation as defined here may be arbitrarily altered in order to relieve the unapparently strained disposition of the mandibular condyles in the articulations.

Lateral Mandibular Movements: The commonly accepted definition for centric relation includes the phrase "from which lateral movements can be made." This would seem superfluous when the condyles are in their unstrained position in the articulations.

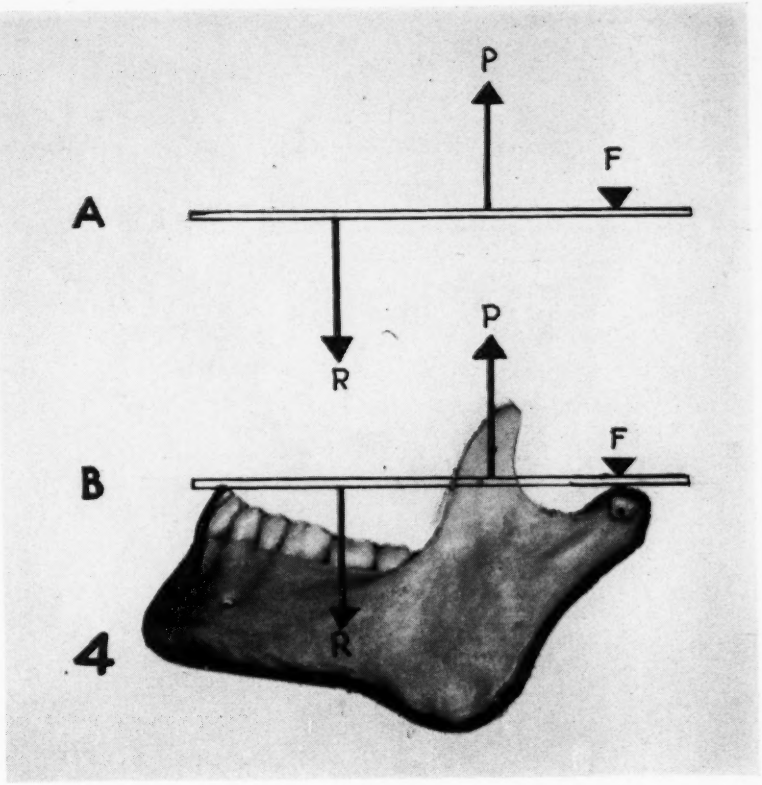
Gothic Arch Tracing: Lateral mandibular movements are clinically used for making a gothic arch tracing, the apex of which is used for determining the most retruded disposition of the mandible in relation to the maxilla. Properly used, the tracing is an excellent method for making this determination. The centric relation, however, as determined by a gothic arch tracing can be a strained relation. The author prefers to obtain this relation digitally even though the method can be subject to considerable error.

Centric Occlusion—The contact relation of the opposing teeth when the jaws are occluded in their centric relation. Centric occlusion is considered to be correct and balanced when the contact relationship of the cusps, fossae, and grooves of the opposing teeth are properly interrelated to each other, as previously described, and in harmony with the centric relation of the jaws. It is incorrect when they are not so related. Balanced centric occlusion of the teeth and centric relation of the jaws must coincide if centric balance in a complete sense is to exist in the masticatory apparatus.

Vertical Dimension—Refers to the degree of separation between the jaws when they are occluded in their centric relation. Usually this measurement is determined by the patient's teeth when they are present or their substitutes when they are absent.

Cause of Faulty Dimension: This dimension may be incorrect due to an excessive loss of tooth structures

4.
A, diagram of a lever of the third class. The power, P, is between the fulcrum, F, and the resistance, R. B, the diagram of the lever of the third class superimposed on a mandible, which mechanically is a lever of the third class.



or drifting of the teeth, or it may be incorrectly restored. The vertical dimension is intimately related to the rest position of the mandible which it must not violate. The vertical dimension must be at least a few millimeters less, dimensionally, than the degree of separation between the jaws when the mandible is in rest position.

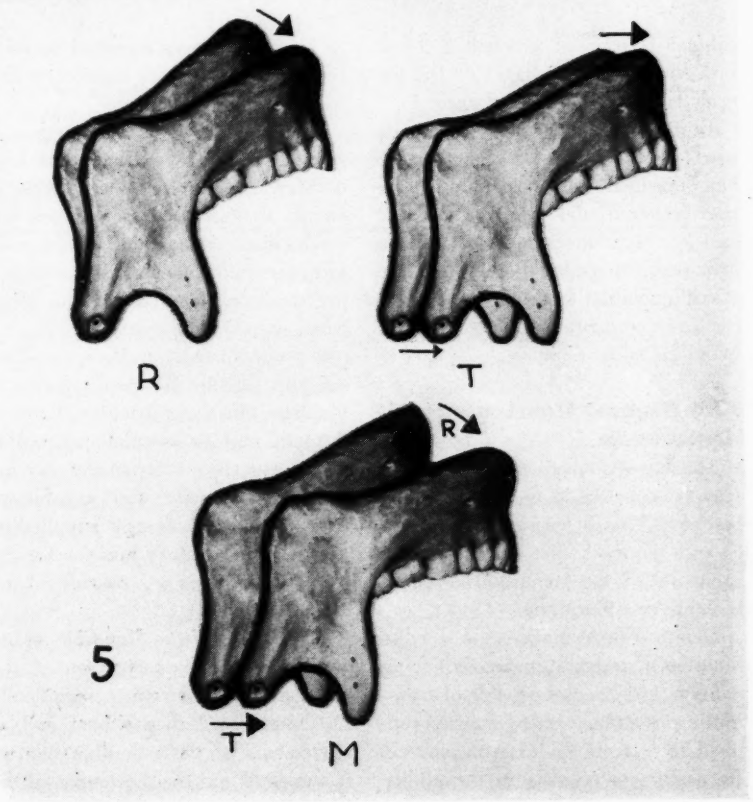
Free-way Space: The interocclusal space between the teeth, when the mandible is in rest position, is known as the free-way space, and varies within a range of 2 to 8 millimeters in different patients. In any restorative procedure, the vertical dimension must respect this free-way space.

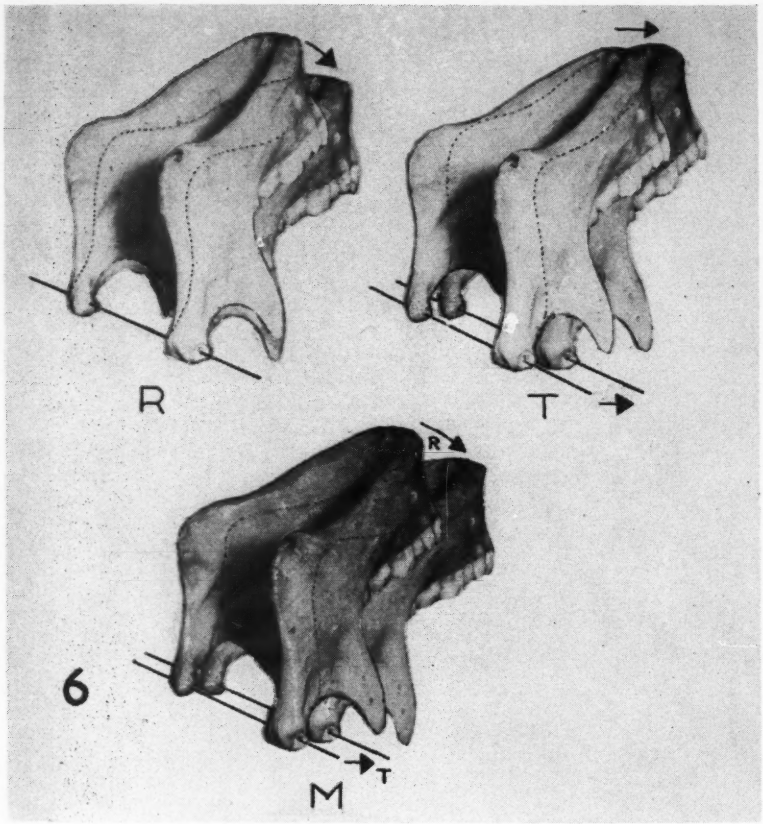
The Rest Position—The postural disposition of the mandible relative to the skull when the mandible is suspended by the tonic contractions of the muscles acting on it to overcome gravity. Normally, the rest position is fairly constant in the patient but under certain circumstances may vary within small limits. It is the unstrained postural position of the mandible from which all functional mandibular movements are considered to start and end.

"Bite" Record—An abbreviated term for the interocclusal wax "bite" record which is the record of an occluded maxillomandibular relation as recorded on wax placed between the opposing jaws and/or teeth.

Further Identification: The "bite" record is further identified by the nature of the occluded maxilloman-

5.
The gliding mandibular lever as a plane figure showing its two basic movements of rotation around its fulcrum, R, and translation of its fulcrum, T. Also shown is a resultant movement, M, which is a combination of both basic movements. The movements the mandibular lever is permitted to make are determined by the articulations which join the mandibular lever to the skull.





6.
The gliding mandibular lever as a three-dimensional structure showing its two basic movements of rotation around its fulcrum, R, and translation of its fulcrum, T. Also shown is a resultant movement, M, which is a combination of both basic movements.

The mandibular condyles are the bearings which together comprise the fulcrum around which the mandibular lever turns. The mandibular hinge-axis passes through the fulcrum of the lever. This is a law which governs levers. The gliding movement of the mandibular hinge-axis is shown.

dibular relation of which it is a record, that is, centric, right or left lateral, or protrusive "bite" record.

Clinical Use: "Bite" records are used exclusively in the method to be described for determining the maxillomandibular relation of the casts or appliances mounted on an articulator in order to duplicate the maxillomandibular relations of a patient as a substitute for the patient's mandibular movements.

The Human Masticatory Apparatus

The human masticatory apparatus may be considered to be a biologic machine. This discussion is concerned with the mechanics of the machine exclusive of the important essential biologic considerations.

Definition—A machine is a combination of resistant materials having definite motions and capable of transmitting or transforming energy supplied to it from an external source. Its usefulness consists in the ability to alter the energy supplied so as to render it available for the accomplishment of a desired service.

A Mechanism—A combination of resistant materials whose parts have constrained movements regardless of energy or output of useful work is a mechanism. A machine is composed of one or more mechanisms and is a practical development of the latter when energy is in question.

Human Masticatory Machine—This complex satisfies the requirements of the definition for a machine. Parts of the skull and its articulated mandible are the resistant structures having relative movement and capable of transmitting the energy supplied to it by the masticatory muscles for the purpose of incising, crushing, and grinding food.

Movements of the Mandible—Concern is with the mechanism of the masticatory apparatus, specifically the constrained dispositions and/or movements of the mandible relative to the skull and the mechanics of the articulations connecting these structures.

Function Facilitated—The geometric form of a sphere is structurally suited to facilitate the efficient function of the masticatory machine, specifically, the application of force (Figs. 1 and 2).

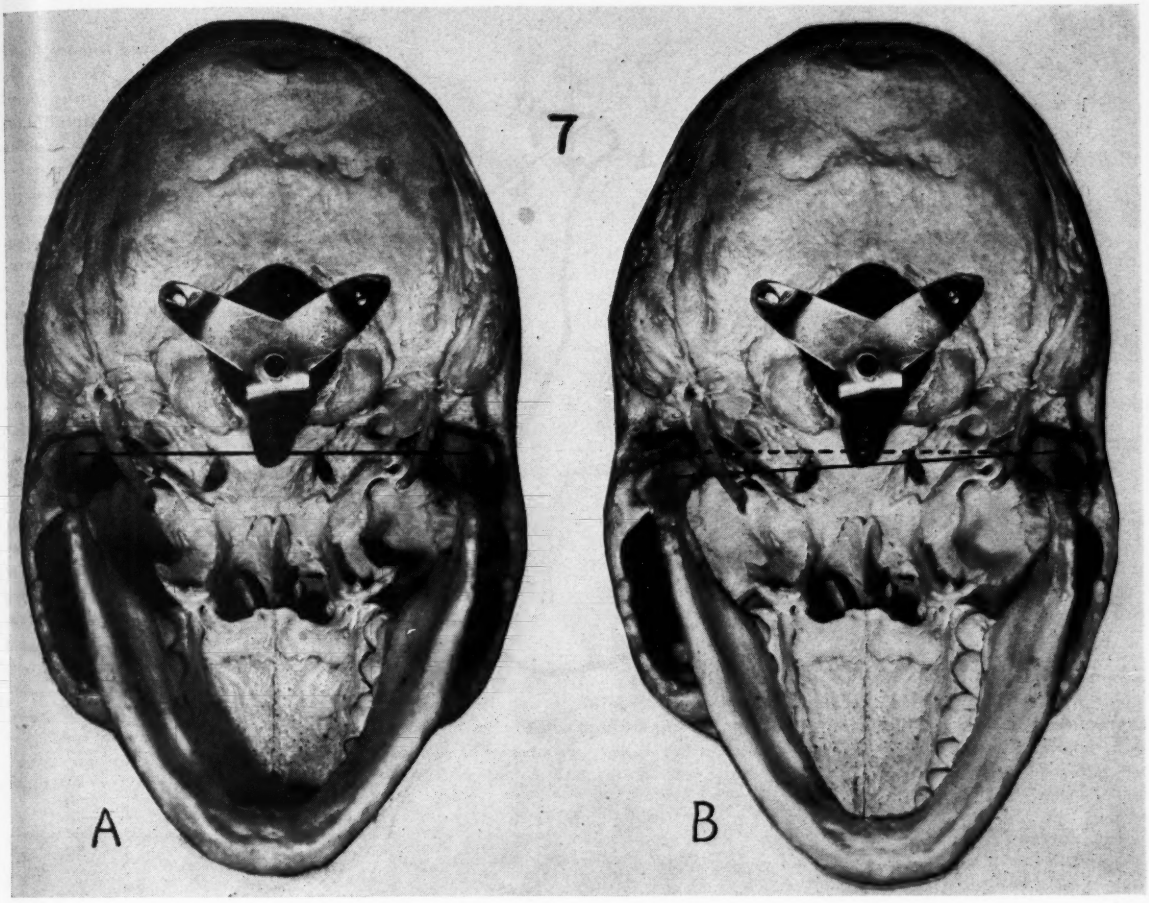
Attached Parts—The opposing teeth are the specialized attached parts of the masticatory mechanism. The major clinical problem in occlusion of the teeth and articulation of the jaws is the development of occlusal balance in harmony with the patient's masticatory mechanism which is unique for each patient. In rare instances, not to be discussed here, certain minor modifications in the mechanism itself must be made.

The Mandibular Lever

Mechanically, the mandible is a lever of the third class capable of constrained hinge-like rotational and gliding movements or a combination of these two types of movements. The hinge-like rotational movement is the primary movement of the mandibular lever.

Accommodating Movements—The gliding movements are secondary accommodating movements for shifting the relative disposition of the fulcrum around which the lever turns with respect to the skull. The gliding movements are also important to permit the scissor-like action of the mandibular lever against the skull.

Increase of Mechanical Efficiency—Shifting of the fulcrum of the mandibular lever is necessary for increasing the mechanical efficiency of the



7.
The underside surface view of the mandibular lever and the skull showing a lateral gliding mandibular movement. A, the mandibular lever in its "centric" relation relative to the skull. B, a right lateral eccentric relation of the mandibular lever. For the lateral movements, one of the condyles, or bearings of the fulcrum, is relatively immobilized and the other condyle of the fulcrum rotates around a vertical axis in the region of the immobilized condyle. The specific nature of these movements is determined by the structure of the articulations.

lever by placing it in the most advantageous and convenient position for hinge action against the skull as well as to modify grinding and triturating movements for the incision, crushing, and grinding of food.

Constraint Determined by Joining of Structures—The temporomandibular articulations joining these structures to each other determine the character and degree of constraint imposed upon their relative movements.

Subject to Physical Laws—Without exception, the mandibular lever is subject to all the physical laws which govern levers. A lever always turns around an axis passing through its fulcrum which, by definition, is the support or bearing on or against which a lever rests or turns.

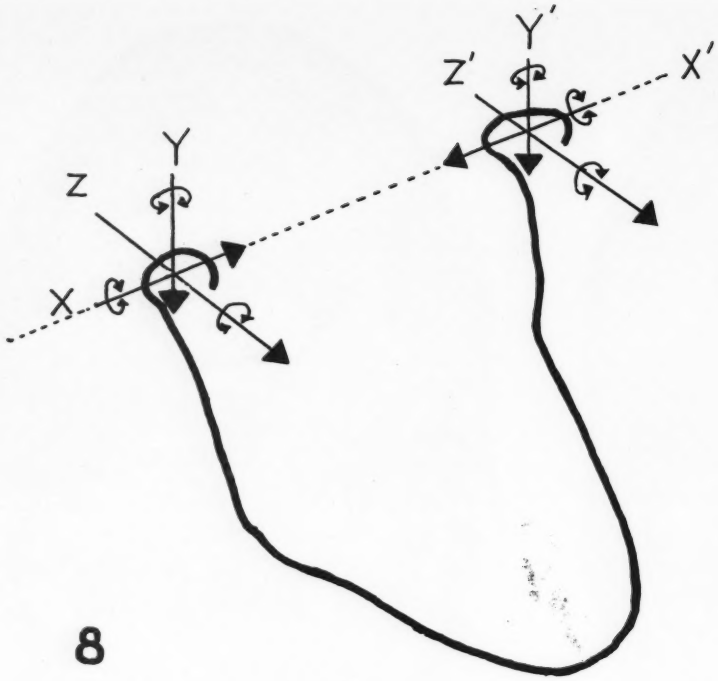
Mandibular Condyles—Because of the peculiar modified U shape of the mandibular lever, the fulcrum, around which its hinge-like rotary movement takes place, is structurally divided into two bearing elements, the mandibular condyles.

Condyles Functionally United—These two condyles, however, are physically united parts of the same single bone, a rigid structure, and must be considered to be functionally united. Hinge-like rotary movements of the mandibular lever can only take place around an axis passing through both condyle elements.

Confirmed Kinematic Principle—One of the condylar elements alone cannot serve as an independent bearing point for the lever through which an independent axis passes. This is a kinematic principle.

Three Points Must be Known—The motion of a body is studied by observing the motion of certain points on it. The number of points to be considered depends upon whether the body can move in any manner or whether its motion is limited to some special kind, for example, plane motion, or rectilinear motion. In general, to determine the motion of a body completely, the motion of three noncollinear points on a body must be known.

Example: If three points are fixed



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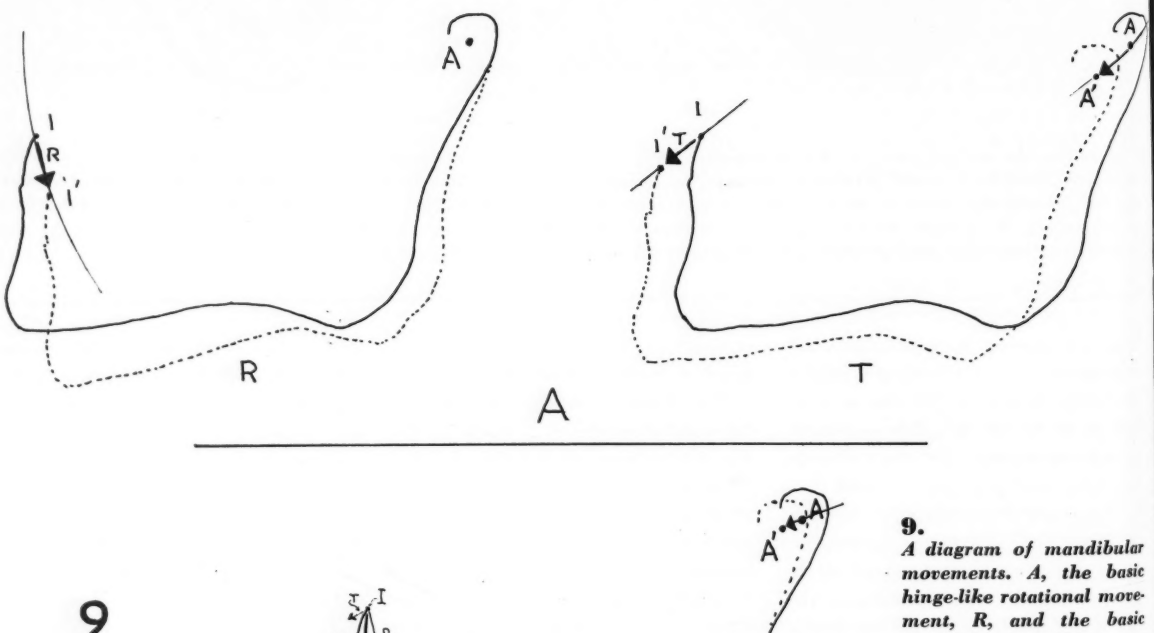
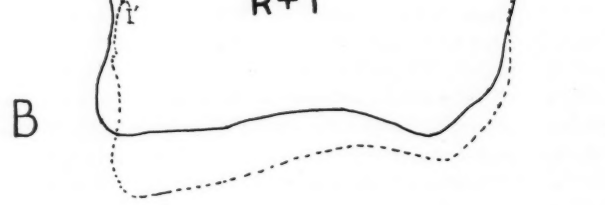
8.
A diagram showing the theoretically possible movements of each of the mandibular condyles, or terminal bearings of the fulcrum of the mandibular lever. Each of the condyles is capable of rotation around three intersecting axes, X, Y, and Z, and translation in any of the three planes determined by these axes. The movements are limited, however, by the structure of the articulations. The movements of each of the condyles must be cooperative with each other, that is, a movement of one of the condyles must always be accompanied by a compensating movement of the other condyle, since both condyles are part of the same mandibular structure.

Obviously, the movements of the fulcrum of the mandibular lever, collectively the condyles, is complex because of the freedom given these movements by the structure of the articulations which join the mandibular lever to the skull and which regulates their relative movements.





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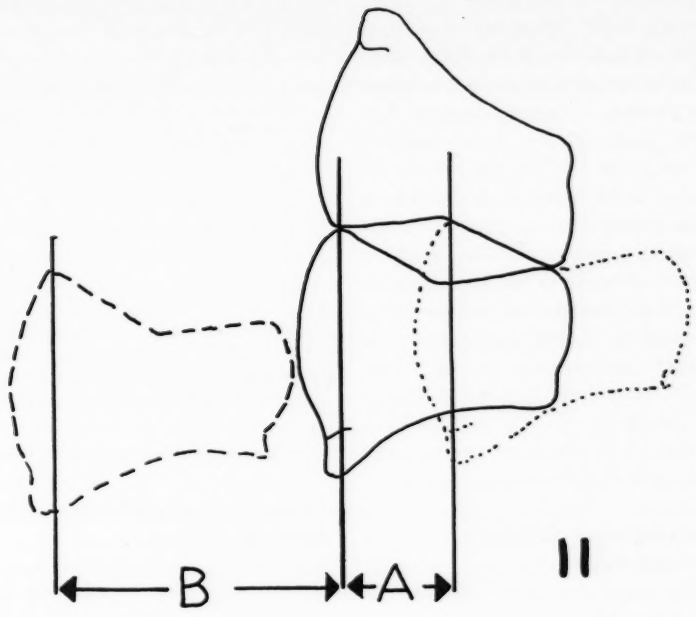
9.
A diagram of mandibular movements. A, the basic hinge-like rotational movement, R, and the basic translational gliding movement, T. B, a resultant movement which is a combination of the two basic movements, R plus T. The resultant movement of an incisal point I to I', M. is shown with the resolved basic movements, R and T.

10.
An enlarged diagram of the movement of the incisal point I to I' in the previous figure. The resultant movement, M, is shown with the resolved basic movements, R and T. Obviously, the movement of any other points on the mandible must be resultant movements of the combination of both basic movements of rotation and translation.

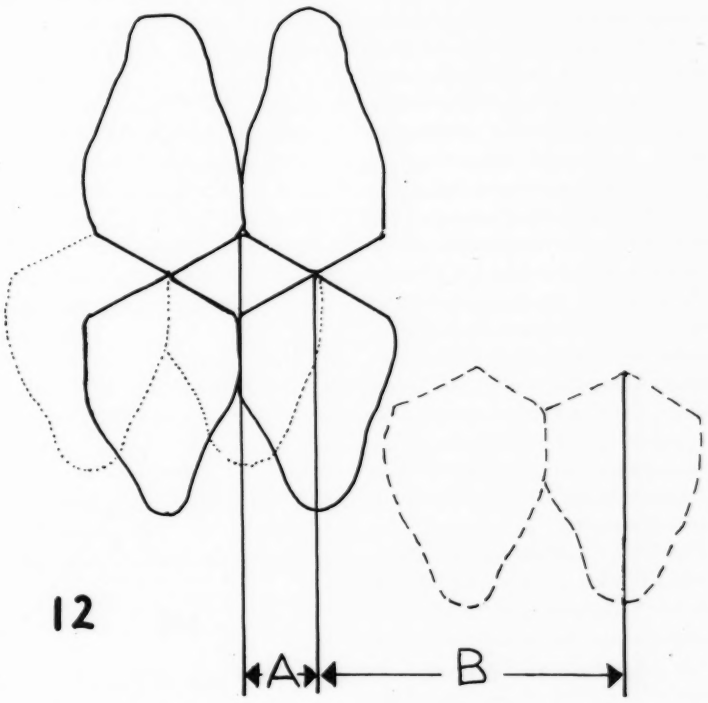


11.
A diagram of the cross section of opposing molars showing the functional range of the occluded mandibular movement, A, and the nonfunctional range of occluded mandibular movements, B. Only the occluded mandibular movements within the functional range are of any importance from the standpoint of balanced occlusion and articulation.

on any body, it is evident that no motion is possible unless these points lie in a straight line. Likewise, if each of the three points is moved along a definite path in space, any other point on the body will also follow a definite path, and constraint is complete.

Constraint in Plane Motion: When a body has plane motion, such as hinge-like motion, by the same reasoning it will be seen that it is only necessary to control the motion of two points, not in a straight line perpendicular to the plane of motion, in order to secure complete constraint.

Possible Rotational Points: If the mandibular lever were to be considered as a body not having any width or thickness, one of the two points through which an axis for hinge-like rotation passes could be one of the condylar bearings which is known to be fixed in its relation to the lever. The other point which can rotate around the fixed point could be in the incisal region of the lever.



12.
A diagram of the side view of opposing bicuspids showing the functional range of occluded mandibular movement, A, and the nonfunctional range of occluded mandibular movement, B.

Third Point Necessary—The mandibular lever, however, *does* have width and thickness. A third point must be engaged in order for hinge-like rotation of the lever to place. Any third point on the lever which is known to be fixed would have to be on the same straight single line or axis, passing through the first fixed point in question and the two fixed points, or condylar bearings, must be on a single straight line perpendicular to the plane of hinge-like motion. The straight line passing through these two fixed points is called the mandibular hinge-axis. This will be illustrated later when the mandibular hinge-axis is discussed.

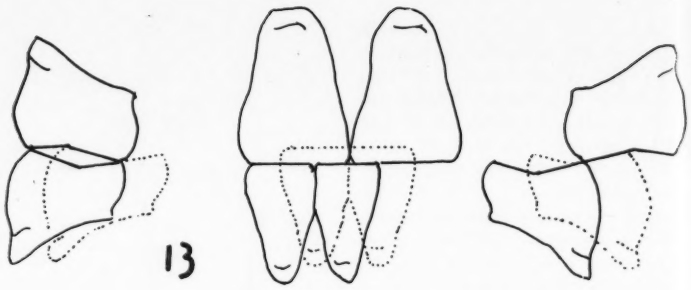
Mandibular Gliding Movements

The same kinematic principle for the determination of motion is applicable for the study of the gliding movements which shift the fulcrum of the mandibular lever and the axis around which the mandibular hinge movement takes place.

Movements Around Hinge-Axis—Since the movement of three noncollinear points on a body can determine its motion, and since two of those points are the points through which the mandibular hinge-axis invariably passes, it is evident that all the mandibular movements other than the hinge movement around its hinge-axis, (the gliding movements) can be considered to be movements of the hinge-axis itself.

Translational or Rotational Movements—The gliding movements of the mandibular hinge-axis are more specifically described as translational and/or rotational movements of the two points through which the hinge-axis passes, or in effect, translations and/or rotations of the mandibular hinge-axis itself.

Possible Combination of Movements—In view of the above, all mandibular movements may, in effect, be considered to be rotational movements of the mandible around its hinge-axis, gliding movements of the mandibular hinge-axis itself, or resultant movements which may be any combination of the rotational and gliding movements.



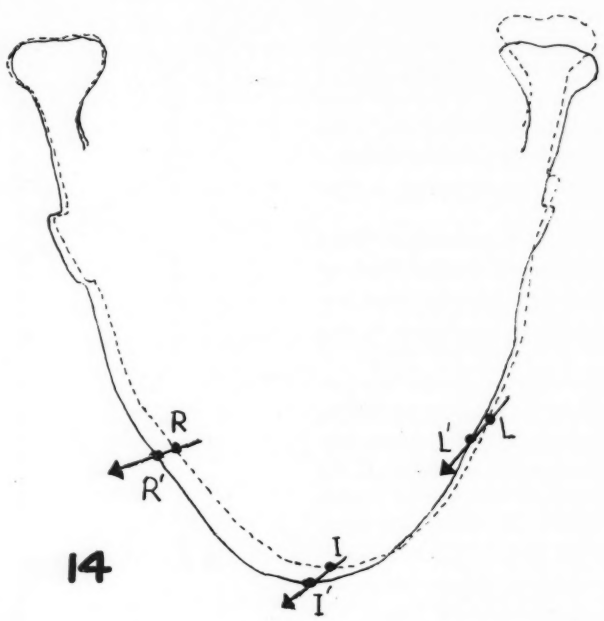
13.
A diagram showing a right lateral eccentric maxillomandibular relation which is the result of a right lateral mandibular movement within the functional range of occluded mandibular movement. Eccentric relations of this nature are used in the method and technique for establishing balanced occlusion and articulation.

Temporomandibular Articulations

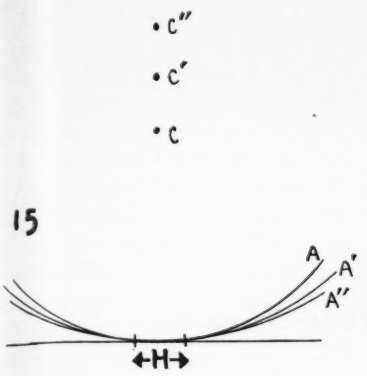
A body has constrained motion when it is so guided by contact with other bodies, or by external forces, that any point on it is obliged to move in a definite path. Partial constraint exists when the movement of a body is only restrained in certain directions in order to move within certain boundaries.

Partial Constraint Improved—The temporomandibular articulations impose partial constraint upon the movements of the mandibular condyles and to the extent of this constraint regulate the mandibular movements.

Structure of Articulation Related to Constraint—The constraint imposed upon the movements of the mandibular condyles is determined by the structure of the articulations which mechanically permit the con-



14.
A diagram of a functional occluded right lateral mandibular movement. The movements of the points R to R', I to I', and L to L' are shown. For the range of movement considered, the points may be considered to be straight line movements even though they are theoretically curved movements.



15.
A diagram showing three arcs A, A', and A" of circles drawn respectively from the centers, C, C', and C". The arcs are superimposed in the area of H. Practically, for the range indicated by H, the arcs may be considered to be straight lines. Point paths of movement within such a limited range of movement, as indicated by H, may be considered to be straight line movements, regardless of what they are theoretically. The point paths of the cusps of the teeth within the functional range of occluded mandibular movements may be considered to be short straight line movements. When the cuspal inclinations of the cusps of the teeth are adjusted, this practical concept is utilized.

dyles to make hinge-like rotational and gliding movements; or as is most usual, any resultant which is a combination of both the hinge-like rotational and gliding movements.

Permitted Movements are Unique—The specific character of the permitted movements are unique for each articulation. The combined synchronized movement of both mandibular condyles is likewise unique for a particular patient.

Description of Gliding Movements—For convenience, the gliding movements of the mandibular condyles permitted by the articulations are described as being either right or left lateral or protrusive movements.

Protrusive Movements—For these movements the gliding movements of each of the condyles are more or less equal.

Lateral Movements—For these movements one of the condyles is more or less stabilized for rotation around a vertical axis in the region of that condyle while the other condyle makes a compensating rotational gliding movement.

Numerous Combination Movements—An infinite variety of intermediate resultant movements which are a combination of the protrusive and lateral gliding movements can also be made.

Movements Regulated by Articu'ation—All mandibular movements are regulated by the constraint imposed upon the mandibular condyles by the articulations. Since the mandibular condyles are considered to be the bearing points of the fulcrum of the mandibular lever through which the mandibular hinge-axis passes, all mandibular movements may be considered to be movements around its hinge-axis and/or gliding movements of the mandibular hinge-axis itself, as regulated by the articulations of the subject.

Occluding and Nonoccluding Movements—All gliding mandibular movements which involve a shift in the position of the mandibular hinge-axis may be classified as being either occluding or nonoccluding movements, depending on whether the opposing teeth are in contact during the movement.

Convenience Movements: The nonoccluding gliding movements are not concerned with balanced occlusion and articulation. They are merely convenience movements for altering the disposition of the fulcrum of the mandibular lever.

Functional Range Limited: Of the occluded mandibular movements which are regulated by the articulations, only that small range of movements which is limited by the contact of the opposing teeth in their centric relation to their cuspal tip-to-tip contact relationship in any eccentric relationship, or vice versa, is of any importance from the standpoint of balanced occlusion of the teeth in harmony with the articulations of the jaws. Occluded mandibular movements beyond this limited range of movement are not considered functionally important.

Useful Range of Small Magnitude: This limited range of movement is considered to be the functional range of occluded mandibular movement. Because this useful range of mandibular movement is of such a small magnitude, the actual movements of the cusps of the teeth may be considered to be small straight line movements, regardless of what they are theoretically.

Effective Substitute for Actual Movements—These movements make it possible to use functional eccentric maxillomandibular relations, which are the resultants of functional occluded mandibular movements, as an effective substitute for the actual movements for which the regulated mandibular movements would ordinarily be used.

Relationships Inseparable—The accompanying figures illustrate the intimate and inseparable relationship between the general shape and form of the structures of the masticatory machine and their mechanical action, or function. The geometric center of the structures and the center toward which forces are directed are approximately coincidental. From an engineering standpoint, the structures are designed for their intended function.

(End of Part One)

246 *Woodmere Boulevard*

The Comparative Fermentation of POLYHDRIC ALCOHOLS *in Saliva From Caries Susceptible and Nonsusceptible Mouths*

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DIGEST

Many investigators have sought to curb caries incidence by advocating the use of substances intended to inhibit or resist the microbial fermentation, which in turn decreases acid production. Grubb[1] has suggested use of the sugar alcohol sorbitol in oral preparations as this sweet polyhydric alcohol is found to be resistant to attack in vitro by the implicated acidogenic bacteria.

Since several polyhydric alcohols are commonly used in oral preparations for technologic purposes, it is important to determine their fermentability by oral microorganisms. The initial observations were carried out in vitro. This method of testing was soon abandoned for the more informative in vivo method. This paper presents a clinical study of the intracarious fermentability of sucrose and glucose as compared with several polyhydric alcohols commonly used in oral preparations.

Early Investigation

Because the acid products of fermentation are of chief concern in the production of dental caries, it was decided to determine the *in situ* pH of the teeth both before and after the ingestion of these compounds.

1. Stephan[2] in 1940 successfully used an antimony electrode for electrometrically determining the pH of plaque and carious material *in situ*. He was able to show that by the ingestion of certain carbohydrates the pH of plaques and open carious lesions can be lowered beyond the critical decalcification level of enamel, 5.5.

2. In 1944, using the antimony electrode, Stephan[3] found that after a glucose rinse the pH drop varied, being greatest in those cases with greatest caries activity.

3. Stralfors[4] in 1948 confirmed Stephan's conclusions, using lactobacillus count as an indication of caries activity.

4. Crowley, *et al.*[5] compared the *in vitro* fermentability of sorbitol, glycerol, and glucose by certain oral microorganisms. Within a 24-hour period the majority of these organisms produced sufficient acid from glucose to decalcify the enamel. Their findings indicated that this result was not the case with sorbitol.

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Author's Note: The assistance of J. P. Kass, T. C. Grubb, and M. Tabak, who have made valuable suggestions on the statistical interpretation of the data, is gratefully acknowledged and to G. P. Foley for his assistance in the preparation of the manuscript, acknowledgements are also made.

[1]Grubb, T. C.: Studies on the Fermentation of Sorbitol by Oral Microorganisms, J. Den. Res. **24**:31-44 (Jan.) 1945.

[2]Stephan, R. M.: Changes in Hydrogen-ion Concentrations on Tooth Surfaces and in Carious Lesions, JADA **27**:718-23 (May) 1940.

[3]Stephan, R. M.: Intraoral Hydrogen-ion Concentrations Associated with Dental Caries Activity, J. Den. Res. **23**:257-66 (Aug.) 1944.

[4]Stralfors, A.: Studies of the Microbiology of Caries. II Acid Fermentation in the Dental Plaques *In Situ*. Compared with Lactobacillus Count, J. Den. Res. **27**:576-86 (May) 1948.

[5]Crowley, M. C.; Harner, V.; Bennett, A. S.; and Jay, P.: Comparative Fermentability of Sorbitol and Glycerol by Common Oral Microorganisms, JADA **52**:148 (February) 1956.

TABLE 1

Mean pH Determinations of Samples of Saliva Incubated Aerobically at 37° Centrigade* (98.6° Fahrenheit)

Approx. 2 Per cent in Saliva	1 day	2 days	3 days	4 days	5 days	7 days	Difference
Sorbitol	7.35	6.68	6.12	6.11	5.31	5.54	1.81
Glycerin	7.31	6.93	6.53	6.51	5.94	6.10	1.21
Sucrose	7.02	5.10	4.82	4.80	4.80	4.90	2.12
Water**	7.32	7.04	7.26	7.39	7.02	7.12	0.20

*Each value represents 60 samples of saliva.
**Water was added to equal volume.

5. Shockley, *et al.*[6] demonstrated that the mixed flora of saliva had little tendency to ferment sorbitol during short periods of incubation *in vitro*.

6. The results obtained by Fosdick, *et al.*[7] substantiate those cited. pH determinations of the dental plaque were made after rinsing the mouth with 50 per cent solutions of sorbitol and sucrose. Fermentation by the plaque microorganisms of the sucrose produced a pH value of 5.38, whereas with sorbitol the pH value was 6.55.

Experimentation

Grubb[1] found that the rate of fermentation of sorbitol was considerably less than that of dextrose and sucrose. In order to obtain an exact picture of the fermentative ability of related compounds, glycerol, sorbitol, glucose, and sucrose were employed in the present study.

Slow Fermentation of Sorbitol—In the first series of observations made on the fermentation of sorbitol by oral microorganisms *in vitro*, it became evident that sorbitol was fermented much more slowly than either glucose or sucrose. This result agreed with the conclusions of Grubb. The resulting pH of the medium in which sorbitol was incorporated did not reach the range (pH 5.5) considered necessary to cause enamel decalcification.[8]

Sorbitol Fermenters in Saliva—A quantitative estimation of sorbitol fermenters in saliva was undertaken using carbohydrate-free media with trypticase. Each of the tested materials was incorporated in the medium. Saliva samples were collected and diluted; 0.1 milliliter was streaked on the surface of the plates. The plates were incubated at 37° centigrade (98.6° Fahrenheit) for 48 hours. The results obtained by the *in vitro* method were encouraging but not conclusive.

[6]Shockley, T. E.; Randles, C.; and Dodd, M. C.: Fermentation of Sorbitol by Certain Acidogenic Oral Microorganisms, J. Den. Res. **35**:233 (April) 1956.

[7]Fosdick, L. S.; Englander, H. R.; Hoerman, K. C.; and Kesel, R. G.: A Comparison of pH Values of *In Vivo* Dental Plaque After Sucrose and Sorbitol Mouth Rinses, JADA **55**:191 (August) 1957.

[8]Fosdick, L. S.; Campaigne, E. E.; and Fancher, O.: Rate of Acid Formation in Carious Areas: Etiology of Dental Caries, Illinois D. J. **10**:85-95 (March) 1941.

TABLE 2

Average pH Readings After 2, 10, and 20 Minutes of Contact with Sorbitol, Glycerin, Sucrose, and Dextrose

Contact Time	Sorbitol	Glycerin	Sucrose	Dextrose
0 Control	6.0	6.3	6.3	6.4
2 Minutes	5.9	6.3	5.0	5.4
10 Minutes	6.1	6.2	5.2	5.5
20 Minutes	6.1	6.2	5.8	6.0

TABLE 3

Mean pH (Treatment-Control Time)

Treatment	2 Minutes	10 Minutes	20 Minutes
Sorbitol	-.02	.15	.16
Glycerin	-.03	-.09	-.10
Dextrose	-.93	-.91	-.36
Sucrose	-1.26	-1.15	-.46
	s.d.=.40	s.d.=.40	s.d.=.41

TABLE 4

Ranked* Mean pH Values Times 2, 10, and 20 Minutes

2 Minutes:	Sorbitol=	Glycerin	<Dextrose	<Sucrose
10 Minutes:	Sorbitol	<Glycerin	<Dextrose	<Sucrose
20 Minutes:	Sorbitol	<Glycerin	<Dextrose	=Sucrose

*All indicated differences are significant at p 0.05.

TABLE 5

Average pH of 186 Teeth in Caries-Free Mouths

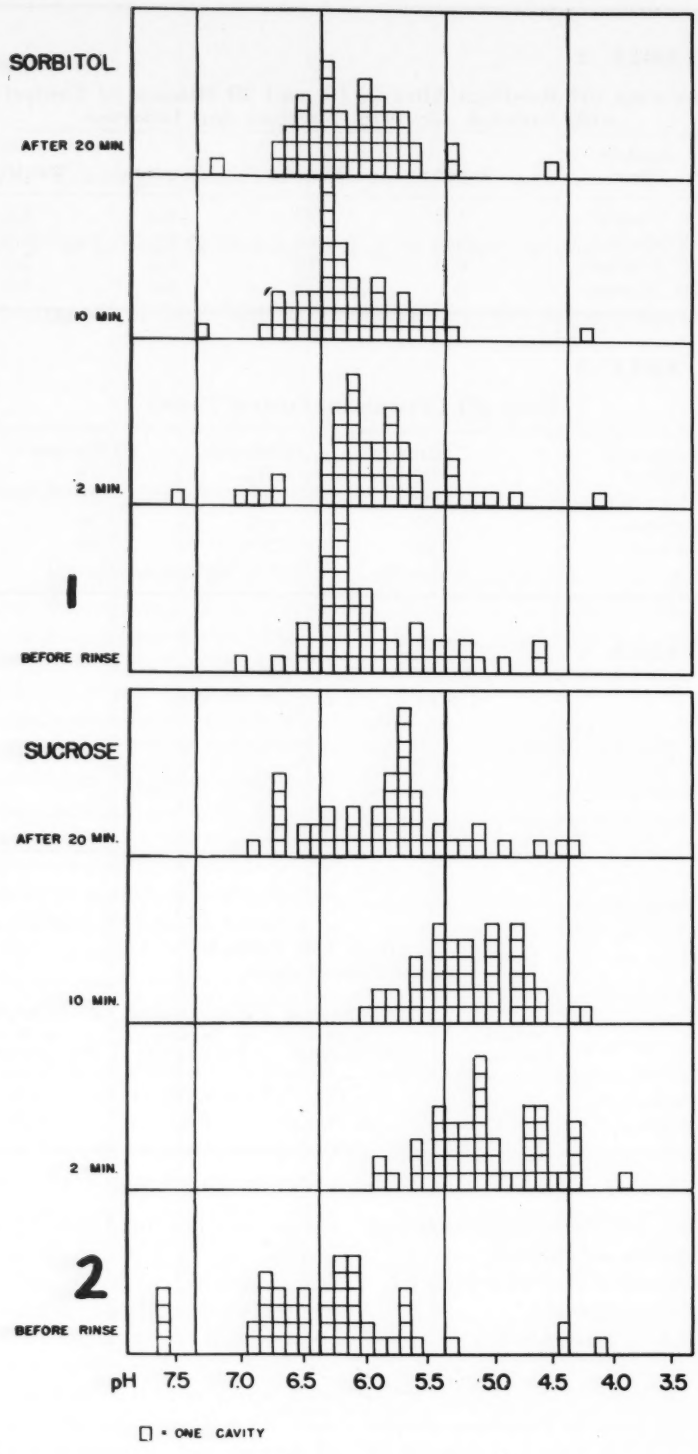
	Before Rinsing	After Rinsing with 3% Sorbitol	After Rinsing with 3% Sucrose	After Rinsing with 3% Glycerin
Teeth	6.22	6.22	6.197	6.19
Saliva	6.42	6.33	6.30	6.31

Mean pH Determinations of Samples of Saliva Incubated Aerobically at 37° Centigrade (98.6° Fahrenheit)

This phase of the experimentation was to determine the changes in pH brought about by inoculating samples of saliva into 2 per cent solutions of sorbitol, glycerin, sucrose, and water.

Procedure—(1) Samples of saliva were collected from sixty people. (2) Those were divided into aliquots and the pH of each determined. (3) They were incubated at 37° centigrade (98.6° Fahrenheit) and pH determinations were performed each day for 7 days. (4) To 3 sets of the same saliva samples, glycerin, sorbitol, and sucrose were added in 2 per cent concentrations. No artificial medium was used. The determinations were made at the same time each day to allow for a 24-hour incubation period between each determination (Table 1).

Study Continued—After the preliminary observations, shown in Table 1, the *in vivo* approach to the problem was adopted with the idea of taking pH readings before and after rinsing with the test solutions.



1.
The number of carious lesions and their pH values before and after 2, 10, and 20-minute intervals using a sorbitol rinse is shown. Approximately 84 per cent of the cases had a pH value of 5.6 or above before rinsing with sorbitol solution. This remained the same 2 minutes after rinsing. At the 10, and 20-minute intervals the number of cases at 5.6 or above was approximately 96 per cent.

2.
The same results are shown using sucrose as the rinse solution. Ninety-two per cent were pH 5.6 or above before rinsing. Two minutes after rinsing about 6 per cent remained above a pH of 5.6. After 10, and 20-minute periods approximately 10 per cent and 39 per cent, respectively, were above the critical pH level of 5.5.

This study was made on 36 subjects, routine patients of various age groups, who presented themselves to the Clinic for dental care. The majority of these patients showed extreme caries activity.

Carious Lesions Tested— The pH determinations, using antimony electrodes, were made of the carious lesions of these patients rather than of the dental plaques since it has been found that after the ingestion of fermentable substances the pH minimums of carious lesions are lower than those of plaque material.[3] In essence this approach constitutes a more stringent test of fermentation.

Method Used—(1) To measure the pH of the carious area the saliva present in the area was removed with the air bellows.

(2) The cavity was not completely dried, only the excess saliva being removed.

(3) The tip of the electrode was inserted into the carious area and the pH noted.

(4) After the initial readings and the times at which they were taken were recorded, the patient was instructed to rinse his mouth for two minutes with 50 milliliters of the solution being tested.

(5) At intervals of approximately 2, 10, and 20 minutes after the rinse, additional readings were made.

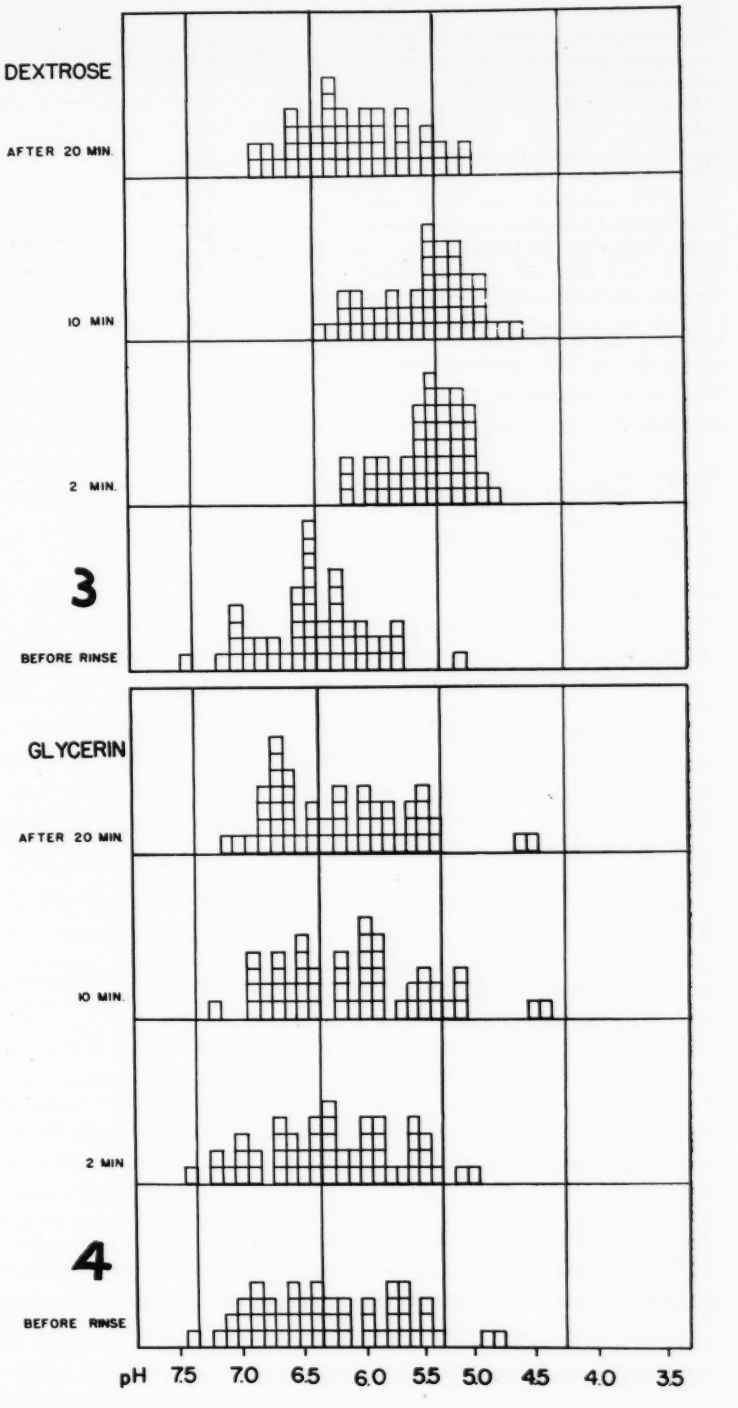
(6) Four solutions (in a 3 per cent concentration) were used as mouthwashes in this experiment: glycerol, sucrose, glucose, and sorbitol.

Statistical Information Illustrated

Two hundred and three teeth were studied in the 36 subjects: 50 each for dextrose and sucrose; 51 for glycerin; and 52 for sorbitol. The

3.
The same results are shown using dextrose solution. Before rinsing 98 per cent of the lesions had pH values of 5.6 or above. After 2, 10, and 20-minutes the numbers of lesions at a pH of 5.6 or above were 28 per cent, 34 per cent, and 82 per cent, respectively.

4.
The same type of observation is represented. However, a glycerin solution was used as the rinse. Before rinsing, approximately 94 per cent had pH values of 5.6 or above. After rinsing approximately 94 per cent had pH values of 5.6 or above. After 2, 10, and 20 minutes the percentages of carious lesions that had pH values of 5.6 or above were 88 per cent, 78 per cent, and 84 per cent respectively.



average pH values with each of the compounds are tabulated in Table 2.

Statistical Evaluation of The Data Obtained

The data graphically represented in Figures 1, 2, 3, and 4 appear more significant when statistically evaluated. The statistical analysis is concerned with a determination of the significance of difference in change in pH (▲pH) for the four solutions employed to rinse the mouth: sorbitol, glycerin, dextrose, and sucrose.

The unit of measurement is

$$pH = pHo - pH_T$$

Where pHo=pH reading before treatment

pH_T=pH reading, T minutes following rinse with a given solution.

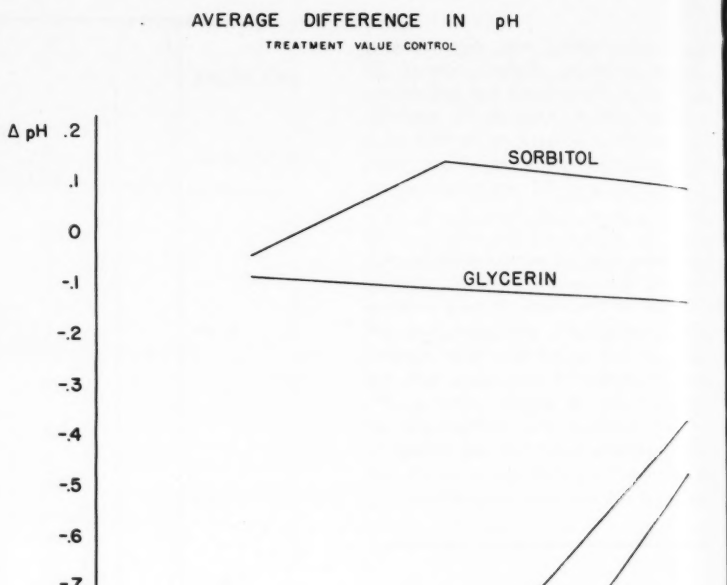
Average Change Recorded—In Table 3 the average change in pH is recorded for each of the solutions tested, at 2 minutes, and 20 minutes after rinsing. These data are graphically represented in Figure 5.

Minimal Changes Recorded—This analysis demonstrates the superiority of sorbitol as the treatment which effected minimal pH changes in carious teeth. The various solutions have been ranked in Table 4 in respect to their activity for 2, 10, and 20 minutes. The symbol (=) indicates that the 2 solutions in question are not statistically different in respect to their fermentative activity. The symbol (<) indicates that the left-hand member is fermented less (associated with a smaller ▲pH) than the right-hand member.

Caries-Free Determinations—Additional pH determinations were made on 186 teeth in mouths of 7 caries-free patients. After rinsing the mouth with 3 per cent solutions of sorbitol, sucrose, and glycerin, determinations were made of the upper and lower teeth and the saliva.

The results are tabulated in Table 5. The values obtained after rinsing with the 3 solutions would suggest that in caries-free mouths the pH

5.
The average differences in pH values are shown graphically. The mean pH values for sucrose are -1.26, -1.15, and -.46 after 2, 10, and 20-minute periods; with dextrose -.93, -.91, -.36; glycerin -.03, -.09, -.10 and for sorbital -.02, .15, and .16 respectively. The mean pH values for the sugar alcohols, sorbitol and glycerin, are in proximity. Those for dextrose and sucrose are similarly grouped at a lower level.



5

changed only slightly or not at all, and in no case approached the critical level of 5.5. Additional pH readings on caries-free teeth are being made.

Summary

1. *In vivo* pH readings of 203 carious lesions made in the mouths of 35 clinical patients by using an antimony electrode show that the pH of the carious lesions ranged from 7.6 to 4.1.

2. The test solutions in 3 per cent concentrations were divided into 2 groups: (1) the fermentable sugars sucrose and dextrose, and (2) the more resistant polyols sorbitol and glycerin. After rinsing with these solutions the pH of the carious area decreased, the extent depending on the degree of fermentation and the subsequent production of acid.

3. Averages of the *in vivo* pH determinations indicate that rinsing with the polyhydric alcohol solutions did not permit the production of enough acids to cause a drop in pH below the critical level for enamel decalcification (5.5).

4. After rinsing with sucrose or dextrose solutions, the pH values recorded at 2, and 10-minute intervals were pH 5.5 or below.

5. Sorbitol and glycerin were metabolized to acid in the carious lesion less than dextrose and sucrose were.

6. Dextrose and sucrose showed significantly lower pH values than the other solutions for at least 20 minutes after rinsing.

7. Two minutes after rinsing, sorbitol and glycerin were not statistically different in fermentative activity.

8. Ten minutes after rinsing, sorbitol was fermented less than glycerin; glycerin less than dextrose; and dextrose less than sucrose. The results were approximately the same after 20 minutes.

9. In caries-free persons there was little or no change in pH after rinsing with solution of sorbitol, glycerin, and sucrose.

University of Maryland

The EDITOR'S *Page*

OF THE two principle types of dental disease, destruction of the *hard* tissues has received more attention than has *degeneration* of the supporting tissues. Caries may be seen and often felt as pain. Periodontal disease is degenerative and is seldom accompanied by pain. Caries is essentially a disease of childhood and early adult life. It is subject to arrest and treatment by specific mechanical measures. Periodontal disease is usually found in older persons and is not amenable to treatment by specific methods. The issue has been clearly stated by Fleming:[1] "Periodontology is essentially a biological problem practiced in a profession that has developed largely along mechanical and technical lines."

The appalling tooth loss rate from periodontal disease is expressed in these stark figures by Williams and Henry:[2] "Tooth mortality rate rises rapidly after 35 years of age, probably because periodontal disease becomes more generalized and more severe in degree by this age. By ages 45 to 51, 50 per cent of the teeth have been lost; by age 60, 60 per cent of the teeth; and 26 per cent of the subjects were edentulous. Despite the high prevalence and high tooth mortality figures noted in the investigations, only 9 per cent of all subjects examined were aware of the presence of periodontal disease; only 7 per cent had received treatment for this condition. . . .

"The prevalence of gingivitis is low at 5 years of age, rises sharply and rapidly to a peak at puberty (12 to 15 years.) A sharp rise in prevalence from 6 to 8 years of age has been assumed to be related to the eruption of the permanent teeth.

"By age 25 years, about 50 per cent or more have detectable evidence of periodontal disease.

"By age 40 years, nearly 100 per cent of individuals are affected.

"By age 65 years all subjects exhibited generalized resorption of alveolar bone."

Any disease that is so widespread and so relentless in devastation of human tissue should receive more attention by basic research and more attention from dental clinicians. Research will, we hope, uncover the multiple causes of the disease and suggest relationships between the causal factors. Research, however, will be without full meaning until the discoveries are put to clinical application. The treatment of periodontal disease, because the condition is so common, must be performed by general practitioners as well as by periodontists. As is the case with the other degenerative diseases, the public must be made aware of the complex processes involved in the disease and of the fact that only a dentist can treat the condition with the self-help and the self-discipline of the patient in matters of personal hygiene.

Glickman and Ramfjord[3] have suggested these subjects and "avenues worthy of further research:"

1) Calculus: its formation, prevention, and removal by nonmechanical agents.

2) The anatomical aspects of periodontium.

3) Connective tissue.

4) Wound healing in the region of the periodontium.

5) The importance of the "stress" syndrome in the etiology and management of periodontal problems.

6) The role of nutrition in periodontal therapy.

7) Trauma from occlusion in the etiology of periodontal disease.

8) The role of occlusal adjustment in treatment of periodontal disease.

9) The effect of toothbrushing, gingival massage, and interdental stimulation (oral physiotherapy) upon the periodontal tissues.

10) Theoretical basis underlying the selection of various types of prostheses in order to benefit the periodontal tissues (fixed and removable prostheses, precision attachments, and splinting).

11) Epidemiology of periodontal disease.

12) Aging and heredity.

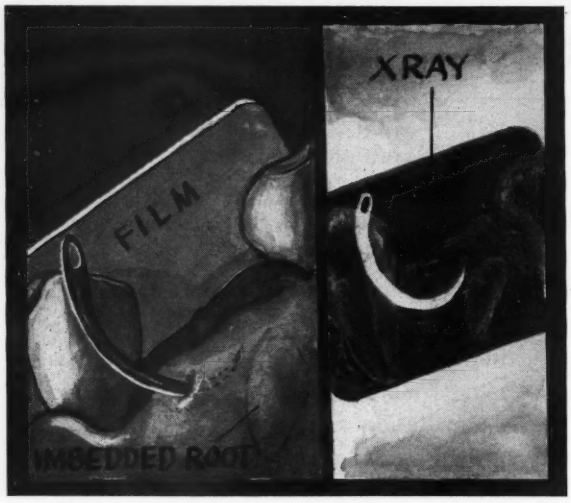
The riddle of periodontal disease will likely be solved in one or several of these areas of biomechanical research, perhaps with an assist from what Hine[4] calls a better knowledge of "complex relationships between many factors, including mental attitudes and psychopathology."

[1]Fleming, Willard C.: Proceedings of a Workshop for Teachers in Periodontology, San Francisco, The American Academy of Periodontology, 1958, p. 92.

[2]Williams, Charles H. M., and Henry, Joseph: ibid., p. 71.

[3]Glickman, Irving, and Ramfjord, Sigurd: ibid., p. 83.

[4]Hine, Maynard: ibid., p. 47.



1

Clinical and Laborato

Locating a Submerged Root

William Weiser, D.D.S., Orange, New Jersey

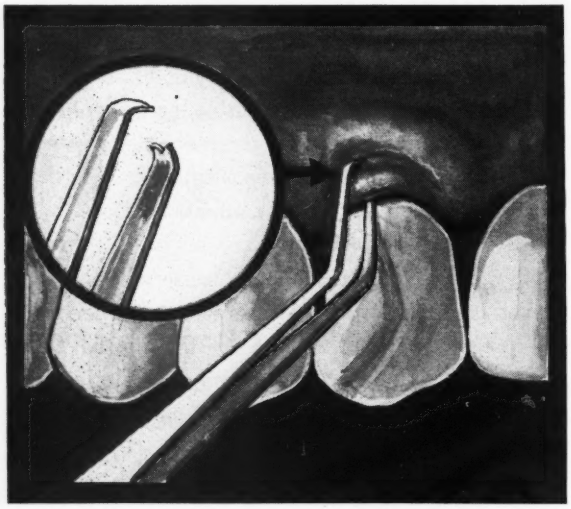
1. After the area is anesthetized insert a suture needle in the approximate area. Take an x-ray of the area. Make an incision at the point that corresponds to the position of the root fragment in relationship to the needle.

2

Removing Denture Teeth

Frank P. Iuorno, D.D.S., New York

2. Cut the acrylic from the lingual side of the teeth to expose the pins or diatoric notches. *Do not perforate the base.* Flow utility wax into this trench. Warm the area with a low flame and while the wax is hot flip the teeth from the base with a sharp instrument.



3

Depth-indicator for a Periodontal Pocket

A. Suzuki, D.D.S., Houston, Texas

3. Bend and sharpen the points of a cotton plier as shown in the illustration. Place one point in the pocket and the other outside. The bottom of the pocket is indicated on the outside of the gingival tissue by pinching the pliers.

READERS Are Urged to Collect $10.00

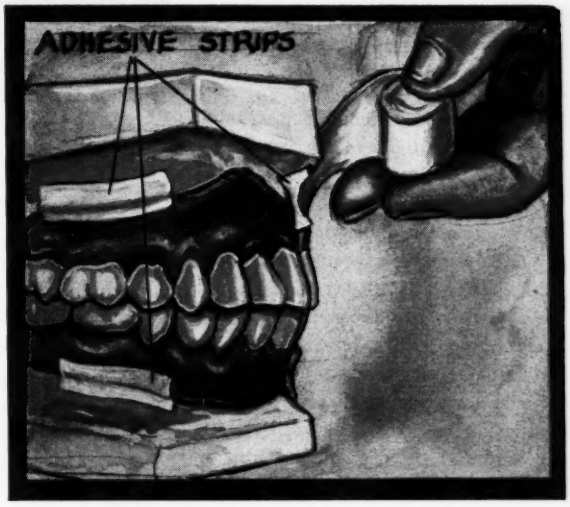
For every practical clinical or laboratory suggestion that is usable, DENTAL DIGEST will pay $10 on publication. You do not have to write an article. Furnish us with rough drawings or sketches, from which we will make suitable illustrations; write a brief description of the

SUGGESTIONS . . .

Securing Baseplates to the Model

A. Holloszy, D.D.S., St. Louis, Missouri

4. Attach adhesive tape to each side of the upper and lower baseplates in such a manner that half the strip sticks to the baseplate and the other half to the model.

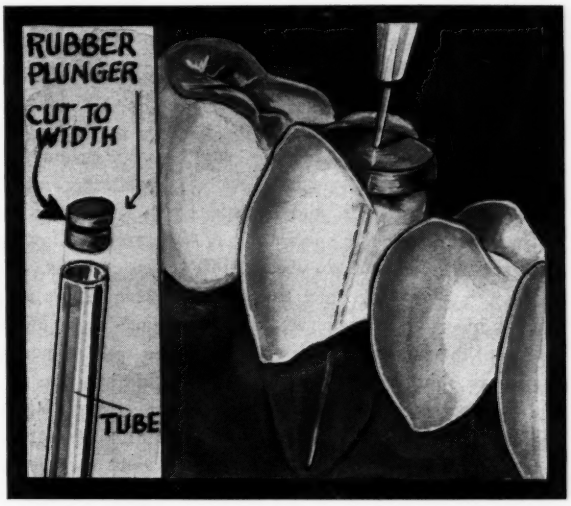


4

A Mechanical Stop for an Endodontic Instrument

Jerome A. Klees, D.D.S., Amenia, New York

5. The rubber plunger from an anesthetic tube makes a convenient device to place on an endodontic instrument to act as a stop to prevent the instrument from passing through the apical foramen.

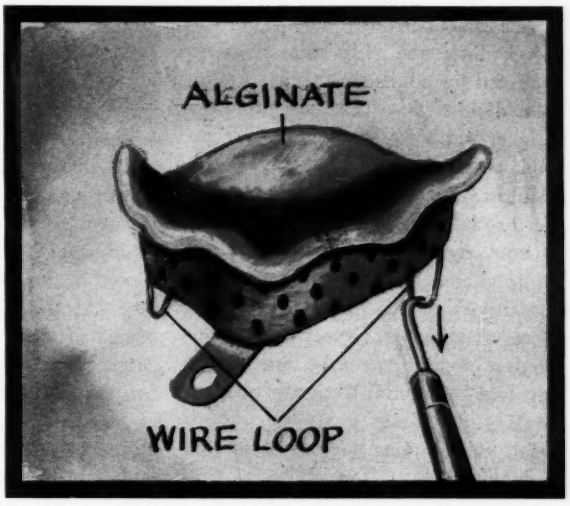


5

Removal of Alginate Impressions

Richard T. Matousek, D.D.S., Apple Creek, Ohio

6. Fasten the two wire loops to the perforated tray. When the alginate has set pass an instrument through the loops to withdraw the impression.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

Vaccination for Influenza

The wider use of vaccine is warranted today in the light of an increasing number of favorable reports. The question now is who should receive the vaccine. The choice is conditioned by the purpose of vaccination.

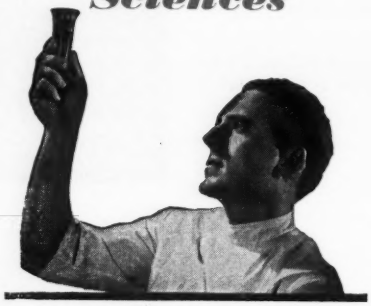
To prevent death, vaccine should be given to: (1) those with chronic debilitating disease, for example, cardiovascular, renal, or pulmonary, (2) pregnant women, particularly during the last trimester when risk is greatest, and (3) the extremely young or old, because mortality from influenza and pneumonia is most common at life's extremes.

To prevent disease, vaccine is most effective in children, because the attack rate is greatest at 5 to 9 years of age. Even above and below these years the rate is great.

To prevent disruption of normal community functions, persons concerned with health services, public safety, public utilities, and transportation, should receive special consideration with respect to vaccination. Also it is wise to protect the homemaker in order to preserve the well-being of the family unit.

Adults should be vaccinated subcutaneously with at least 400 CCA units of virus. Intracutaneous administration for adults is not recommended because the smaller antigenic mass given induces lower and often inadequate antibody levels. Children aged 6 to 12 years may be vaccinated twice subcutaneously at one or two-week intervals with half the dose selected for adults. In this age group, the divided dose schedule promotes higher antibody levels at an acceptable reaction rate—about 20 per cent. Multiple intramuscular doses are given to children 3 months old to preschool age, to provide some protection without invoking the uncommon sensitivity of this group to toxic effects of influenza virus vaccines. Reaction in children can be largely suppressed by administration of aspirin during the first twenty-four hours after inoculation. Such treatment is seldom necessary for adults.

MEDICINE *and the Biologic Sciences*



Recent evidence indicates that high antibody levels can be induced to virus strains not previously encountered. Primary vaccination, although sensitizing anti-body-forming mechanisms of the body, may induce only extremely low levels of antibody to new strains. A second vaccination given six or more months later produces high levels of antibody to old as well as new strains. Annual vaccination has additional merit because high levels of broadly reacting antibodies can be induced with polyvalent vaccines of broadest coverage.

Davenport, F. M.: Recent Advances in Prevention of Influenza by Vaccination, Mod. Med. **26**:115-122

Lung Carcinoma

Bronchogenic carcinoma appears to be increasing in incidence today. Unfortunately, in the early stages it is often undetectable. In many instances metastasis has already occurred at the time the patient is first seen. At the present time the only means of detection are periodic roentgenograms and a constant vigil for the early symptoms and signs of bronchial obstruction.

The important early symptoms are persistent cough, local rhonchus that the patient hears or feels when exercising or when lying on the affected side, clubbing of the fingers, and hemoptysis. Pneumonia that recurs in the same area, resolves slowly or starts without preceding bronchitis also suggests bronchial obstruction. Early signs are related to narrowing of a bronchus and consists of local rhonchus that is brought out by having the patient lie on the affected side, obstructive pneumonitis, atebectasis or a localized area of obstructive emphysema.

Any patient in whom carcinoma is diagnosed bronchoscopially or is strongly suspected should be explored promptly, provided no contraindication is apparent and the functional status of the lungs will permit the necessary surgery.

The rate of growth of a bronchogenic carcinoma may vary greatly. For this reason, size of a tumor is not a reliable index of prognosis. An extremely small anaplastic lesion may be associated with widespread metastasis. On the other hand, a nodule may have slowly attained considerable size without producing distant metastasis.

Lesions that increase slowly in size have the most favorable prognosis. Many such lesions have been resected after they have been known to exist for four or five years, and five-year cures have been attained. It is important to realize, however, that the observation of only a little change in the size of a nodular lesion over a period of several years does not warrant the assumption of benignity.

Pneumonectomy and mediastinal dissection are not required when distant metastasis can be demonstrated. The finding of carcinoma in the scalene fat pad biopsy is a sign of distant metastasis.

Thoracic surgery has come of age and relatively few parts of this country lack good facilities close at hand. Accuracy of radiologic diagnosis has kept pace with the surgical techniques.

Stead, William W.: Indication for Thoracic Surgery, Gen. Practitioner **26**:70-73 (*June* 1) 1958.

School Children—Tuberculin Tests

As a periodic procedure, the tuberculin test is highly recommended for all children after the age of two months and for as long as no reaction is elicited. It is important to detect tuberculosis, if it occurs, as early as possible. The test is the earliest method by which tuberculosis can be diagnosed.

The tuberculin test will detect the disease while the lesions are usually too small to be detected by physical examination, including inspection of the chest by x-ray film. Such small lesions are potential sources of gross clinical disease.

A child who becomes a reactor to tuberculin has usually been in close contact with an adult, such as a parent, grandparent, or other relative who has contagious disease. Seeking the source of the infection among adult associates is a most valuable clinical case-finding method. The earlier the infection in the child is found, the better are the results for the child. Also, the earlier the disease in the child is detected, the fewer other persons will be infected and the better the patient's chances of recovery will be.

The importance of finding the disease soon after the infection has occurred is increased in light of the appearance of antituberculosis drugs. A great many recent tuberculin converters are now being treated with these drugs. Those currently available are not germicidal, but they suppress tubercle bacilli. They do not cure. However, it appears that they occasionally prevent the development of acute forms, such as miliary disease or meningitis.

When the infection is found early the lesions are microscopic and vascular. At this point the drugs may be expected to enter so as to come in contact with all tubercle bacilli. As time passes, however, tuberculosis lesions often lose their blood supply, after which a drug could not be expected to reach the organism in avascular necrotic tissue.

In most parts of the United States, the number of children who develop tuberculosis so as to become reactors to tuberculin is quite small, often not more than 2 or 3 per cent during the grade-school period. There is a high incidence of tuberculosis among persons 40 years of age or older, as manifested by the tuberculin reaction. Some of these older persons become contagious unknowingly and disseminate tubercle bacilli. Children everywhere should be tested periodically to make certain that those who may be infected from unsuspected sources are detected promptly.

Questions and Answers: Examination for School Children, JAMA **167**: 1802 (August 2) 1958.

Psychiatric Diseases of Aging

When psychiatric disease is present in old persons, the changes may be sudden or extremely subtle. From the slight mental alterations in the aging patient there is a sliding scale of increasing impoverishment of mental resources. Usually the old person dislikes more and more to change. He has progressive reduction in his ambition and activity. He becomes constricted and self centered, has increased difficulty in comprehension and requires more time and effort to perform usual duties. New ideas cannot be handled. The deterioration may be hastened by a physical illness, an accident, or severe emotional shock or disturbance. The subject becomes indifferent to the ceremonies and courtesies of social life. He resents interference by young people and complains that he is neglected. He shows a hostile, but anxious or fearful dependence.

Sentiments may be increased and charitable impulses disappear. Often sexual activity may be exaggerated, especially in men with indecencies, generally with children. The old person becomes indifferent in habits of dress and toilet. He tends to be distrustful, prying, and suspicious. He begins to reminisce more as memory for recent life sinks away. Often he lives in his childhood as he recalls early incidents. He may speak of parents and grandparents as persons who are still living.

The orientation becomes defective and confusion severe. Such a person may wander away and get lost. He may go into the kitchen, turn on the gas, and leave without lighting the jet, only to come back later, light a match and cause an explosion. He may become exceedingly reckless at night, wandering about the house in an aimless, distracted way. The aged may hoard articles of no value, carry quantities of worthless objects in pockets, and secrete in forgotten hiding places items that others may need. Hallucinations and delusions are common. Physical incapacitation progressively increases and finally most patients are bedridden. This is senile dementia. Rarely is the onset of this disease noted before 60 years of age.

The reaction of the person to the process of aging depends to a large extent on his previous personality. The well-adjusted, mature, adequate man can handle the sunset of his life well. He can give of himself, of his substance, can share the pleasures of those about him. The person who arrives at this period bolstered only by his defenses sees one after another crumble. He erects new ones, each more rigid, more constricting and more arbitrary. The legal implications are many because promises are broken and wills rewritten.

Boshes, Benjamin: Neurologic and Psychiatric Aspects of Aging, Mod. Med. **26**:71-79 (May 1) 1958.

Alcohol

Alcohol can be absorbed through all the mucous surfaces of the body. When alcohol is ingested, the alcohol is absorbed in the upper portion of the gastrointestinal tract. The comparatively small molecular size permits it to pass readily through membranes by simple diffusion. To a large extent, its absorption follows the principles of diffusion. The greater the difference in alcohol concentration in the fluids on two sides of a

membrane, the more rapid is the diffusion rate from the side of higher concentration to the lower side.

The absorption of alcohol from the gastrointestinal tract is of major interest because of its relation to alcoholic liquors. However, alcohol absorption may result from the injection of its solution into the body, use of an alcohol-containing enema or douche, or inhalation of its vapor.

When alcoholic liquor is swallowed, it is absorbed into the capillary circulation. Arterial blood is slightly higher in alcoholic concentration than is venous blood, especially during the period of active absorption. Absorption takes place at a rapid rate, depending, among other things, on the quantity of alcohol ingested, its concentration in the drink, the nature and quantity of the diluting material already in the stomach and the duration of its sojourn in the stomach.

When taken on an empty stomach, the alcohol from a single drink of liquor has been about 90 per cent absorbed by the end of the first hour. It appears that absorption from the upper portion of the small intestine is even more rapid than the penetration through the stomach wall. Liquor consumed after a meal has less intoxicating effect than the same amount of liquor taken on an empty stomach. This slowing is due, not simply to dilution by the large volume of stomach contents, or the slowing of their passage into the rapidly absorbing small intestine, but also to the coating of the stomach by less permeable food components. It is known that certain fatty foods, such as milk, cream or olive oil could inhibit alcohol absorption, but many nonfat food stuffs do just about as well. A good-sized helping of mashed potatoes is one of the best deterrents of alcohol absorption. Habituation to the use of alcoholic liquors does not materially alter the rate of alcohol absorption. At high altitudes alcohol is absorbed more readily and produces higher blood alcohol concentrations than at sea levels. With nearly all persons, alcohol is rapidly eliminated from the body, chiefly by oxidation to carbon dioxide and water.

Muehlberger, Clarence W.: The Physiological Action of Alcohol, JAMA **167**:1842-1845 (August 9) 1958.

Contra-Angles

Profile of the Stress-Blind Man

DESPITE the exhortations from biologists who know the most about the affairs of the human organism, many of us insist on destroying ourselves. It is not overt suicide, but a kind of defiance that psychologists may call a fulfillment of the death wish. Many of us continue to overdraw our account in the biologic bank and end in the final bankruptcy of death too soon. We are blind to our own potentials and blind to our tolerances—*stress-blind*. We know less and seem to care less about ourselves than about the *things* around us. Our lives seem to be of less concern than our automobiles.

We resist information that may help us; we accept the trivia of conversation and of entertainment that does us little long-term good. When serious conversation on fundamental subjects is introduced many of us flee posthaste to lighter subjects. We are appalled with the prospect of being labelled "intellectual" or "serious." Is it that we fear to listen to important and sometimes disturbing subjects and prefer the safety of small talk? Do we choose the blinders of "I won't look" for some reason of inner security?

Do you recognize any part of yourself in this portrait drawn by Henry I. Russek, M.D. in the *Journal of the American Medical Association?*"

"In almost every instance we found the young coronary patient to be a victim of overwork, often as a result of an unrelenting drive, an intense desire for recognition, or a profound sense of obligation to his employer, his family, or others, but more commonly simply as a consequence of meeting life's challenges with maximum and unstinting effort. It was apparent that these patients had been compulsive about time, overmeticulous, and 'blind' to their own stress end-point. They were often concerned about trivia, impatient with subordinates, and worrisome. As perfectionists they frequently chose to do the work themselves rather than to delegate it to others. Being *'stress-blind'* they took on more responsibilities at an occupational, social, or domestic level than good judgment appeared to dictate, minimized their symptoms, and neglected prudent rules of health. Perhaps the most characteristic trait of the young coronary patient, however, was his restlessness during leisure hours and his sense of guilt during periods of 'relaxation.' As a consequence, he rarely took vacations, and such leisure time as he did possess was frequently regimented by obligatory participation in an assortment of social, public, or educational activities."

We should all be familiar with the monumental research on stress that has been done by Hans Selye. Do we believe, as he believes, that: "Adaptation energy seems to be something of which everybody has a given amount at birth, an inherited capital to which we cannot add, but which we can use, more or less thriftily, in fighting the stress of life?

"When a human being is born—unless he wants to kill himself—he cannot stop, either, before he has completed his mission on earth. Yet he too can do much, through voluntary choice of conduct, to get as far as possible with a given bodily structure and supply of adaptation energy, under given social conditions. For instance, he can live and express his personality at a tempo and in a manner best suited to his inherited talents, under the prevailing social conditions. The two great limiting factors—which are set once a man is born—are: his supply of adaptation energy and the wear and tear that the weakest vital part of his body can tolerate.

"So, actually, we can accomplish a great deal by living wisely in accord-

ance with natural laws. We can determine our optimum speed of living, by trying various speeds and finding out which one is most agreeable."

Do we accept the philosophy of the prudent life so ably expressed almost a quarter-century ago by the respected cardiologist, Sir Thomas Lewis?-

" 'Very prudent people live quietly and moderately; they have their simple daily routine of work and pastime, enlivened by occasional excursions and entertainments, social gatherings and visits to and from their friends. They are temperate in their eating, taking no more than will maintain them in robust health, arranging their diet to consist chiefly of plain good food, relieved occasionally of its monotony by a more elaborate, but not heavy meal. They are regular in their habits of work and exercise, and in their mealtimes. They are strictly temperate in their drinking. They control their emotions and their passions. They avoid all forms of excess. They use tobacco little if at all. They welcome the freshness of abundant air and open spaces, delighting in the feeling of invigoration that accompanies active exercise; they love the warmth of sunlight playing on their skins and the sleepiness of healthy fatigue. These are habits that few people in industrial countries now adopt, that fewer still maintain. The cares and distractions of an increasingly complex life, indoor or sedentary occupation, advancing years and decreasing energy interfere less or more, and the prudent rules are neglected; neglect is the easier because the penalties, owing to the body's great power of resistance to disease, are uncertain in their incidence and often long deferred.' "

Above are the words of three eminent physicians. At this beginning of the New Year and at the time of good resolutions are we prepared to see any part of ourselves in these projections of the *stress-blind* man?

Learning Made Easier

The dentist or oral surgeon may now sit comfortably in his home or office and view a series of 1400 pairs of colored stereoscopic pictures on surgical procedures. These pictures are mounted on reels of 7 pairs each and are studied through an electrically illuminated three dimensional View-Master® focusing stereoscope. With each slide is a description of the surgical procedure published in book form.

This material has been developed by Wilton W. Cogswell, D.D.S., visiting professor of oral surgery, University of Kansas City, School of Dentistry. The stereoscopic pictures are used as teaching aids at that school and are available to the profession through the medical publishers, Williams and Wilkins of Baltimore, and J. W. Stacey, Palo Alto, California.

Reunion

Although this is not the time of year for "reunions" there are always dental meetings to attend and these are reunions of sorts.

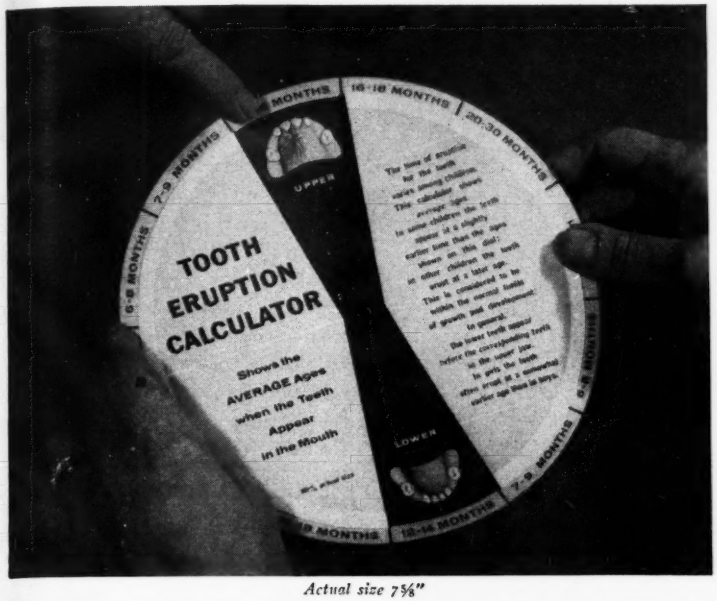
Whenever men (and more particularly women) come together the covert looks of appraisal are made. The other fellow looks a little older, balder, and fatter than you *think* you do yourself. The other fellow is thinking the same thing about you. The other paunch is more noticeable than your own!

Men, prompt to deny these allegations, are sensitive about "looking old." The toupee trade and the elastic abdominal supports are rather futile attempts to turn time backward in flight. Men are probably less often customers of the plastic surgeon than are women: to pick up the slack in a sagging chin line, to uplift the pendulous, or to trim a bit from the hams. Even the most respectable of the journals in surgery often give tips on such techniques to the surgeon who wishes to explore the territories of anti-geriatrics.

When old friends meet in reunion lightning appraisals are made in the physical, economic, and social fields. Status is determined by how one looks —tired or drawn; too fat for comfort, too thin for prosperity; too stooped from work, too straight from sports. What joints are stiff, what face is slack? What voice is strong, what wrinkle deep?

Economic status is shown by the car one drives, by the spots upon the

(*Concluded on page* 48)



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necktie, by ornaments that flash and glitter on the body of man and wife.

Social prestige is acclaimed by the clubs one boasts, the trips one takes, by the address upon a street, by the schools that children attend.

Reunions are often times of ribald jest and bonhomie that has a hollow ring. Nostalgic talk that hangs heavy in the air falls flat because the years between have broken the chain of meaning. Wives sit by with boredom patiently concealed or frankly expressed. The yawn may be hidden with grace behind a manicured hand or openly made to show teeth that have received scant care from the dentist-spouse who tries so hard to acclaim his status before his friends of other days.

Nicknames that on another day might have expressed some of the exuberance of youth sound absurd when bestowed upon a friend who has passed the mid-point of his life.

The sensitive soul feels the tones of sadness in reunion because he may realize that none has lived up to his ambitions and expectations. He recalls the boasts of youth and now in later regret knows that they will never be.

Human relationships need constant culture. A meeting among friends once a year or every ten years is not enough. The reality stands stark that years have dimmed interest and rapports; that each one has adopted a different set of interests and values. Men accept this fact with less grace than do women. Reunions may be sad affairs for men because they are sentimentalists and enjoy the flow of reminiscence. Women are the ones who see children grow and pass from stage to stage. They are always mystified because they see their *men* grow so little!

E. J. R.

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